

Technical Specifications For:

Electric Upgrades  
**Vista Academy of Visual & Performance Arts**  
Vista Unified School District

ASDG Job Number: 23-016

Client:

Vista Unified School District  
1234 Arcadia Ave.  
Vista, CA  
92084

Architect:

AlphaStudio Design Group  
6152 Innovation Way  
Carlsbad, CA  
92009  
760-431-2444

Electrical:

Johnson Consulting Engineers  
12875 Brookprinter Pl. #300  
Poway, CA  
92064  
858-679-4030



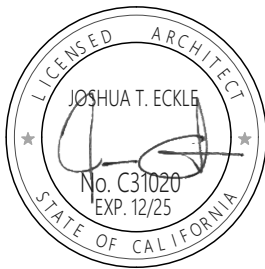
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Architect:  
Joshua Eckle



Electrical Engineer:  
Monica Hansen

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**SECTION 01 1000  
SUMMARY**

**PART 1 GENERAL**

**1.01 PROJECT**

- A. Project Name: Electric Upgrades at Vista Academy
- B. Owner's Name: Vista Unified School District.
- C. Architect's Name: AlphaStudio Design Group.
- D. The Project consists of the upgrade of the existing electrical service components at Vista Academy
- E. The Project shall comply with Title 24, Parts 1-6, and 9.
- F. A copy of Title 24, Parts 1-5 must be kept on site at all times during construction.

**1.02 DESCRIPTION OF ALTERATIONS WORK**

- A. Scope of demolition and removal work is indicated on drawings.

**1.03 OWNER OCCUPANCY**

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Contractor to cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

**1.04 CONTRACTOR USE OF SITE AND PREMISES**

- A. Construction Operations: as negotiated with Owner.
  - 1. The Contractor shall have an approved logistics plan prior to beginning construction activities.
- B. Arrange use of site and premises to allow:
  - 1. Owner occupancy.
  - 2. Work by Others.
  - 3. Use of site and premises by the public.
- C. Provide access to and from site as required by law and by Owner:
  - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
  - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Existing building spaces may not be used for storage.
- E. Utility Outages and Shutdown:
  - 1. Limit disruption of utility services to hours the building is unoccupied.
  - 2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
  - 3. Prevent accidental disruption of utility services to other facilities.
  - 4. In the event that any or all life safety systems are shutdown, the Contractor shall provide Life and Safety watch for the entirety of the shutdown.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

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**SECTION 01 2000  
PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

**1.02 SCHEDULE OF VALUES**

- A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
- B. Substitute forms containing equivalent information may be considered in lieu of AIA G703. Contractor shall submit proposed form to Architect for review within 10 days after issuance of the notice to proceed for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit Schedule of Values in PDF format, electronically within 10 days after the notice to proceed.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Avoid vague terms when itemizing the Schedule of Values.
- F. Revise schedule to list **approved** Change Orders, with each Application For Payment.
- G. Contractor and subcontractors to provide schedule of values for all lump sum items at or prior to the pre-construction meeting and when submitting payment application.
- H. The Schedule of Values shall be organized in a manner that itemizes major construction elements and their associated costs. At a minimum the Schedule of Values line items shall be formatted as follows:
  - 1. The Schedule of Values shall be organized in a logical manner that lists tasks in the sequence in which the work will be performed.
  - 2. Contractor's insurance and bonds shall be listed as separate items.
  - 3. Development of the project's CPM schedule and subsequent monthly updates shall be listed as separate line items.
  - 4. Elements that require recurring maintenance during construction, such as storm water BMP's, shall include line items for initial installation and subsequent maintenance.
  - 5. Each major construction element shall have separate line items for labor, material, associated equipment and material storage (if required).
  - 6. Construction assemblies, such as concrete foundations, shall be listed by individual components (concrete, rebar, vapor barrier, etc.) not final assemblies.
  - 7. All allowances and contingency shall be listed as separate items.

**1.03 APPLICATIONS FOR PROGRESS PAYMENTS**

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. The contractor shall submit to the Architect, Inspector, and Owner a pencil draft of the payment application for review and comment a minimum of five business days prior to issuance.
- C. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.
- D. Substitute forms containing equivalent information may be considered in lieu of AIA G702 and G703. Contractor shall submit proposed form to Architect for review within 10 days after issuance of the notice to proceed for approval.
- E. Forms filled out by hand will not be accepted.

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- F. For each item, provide a column for listing each of the following:
  - 1. Item Number.
  - 2. Description of work.
  - 3. Scheduled Values.
  - 4. Previous Applications.
  - 5. Work in Place under this Application.
  - 6. Approved Change Orders
  - 7. Approved Allowance Usage Requests (AUR's)
  - 8. Total Completed and Stored onsite to Date of Application.
  - 9. Percentage of Completion.
  - 10. Balance to Finish.
  - 11. Retainage.
- G. Execute certification by signature of authorized officer.
- H. Submit Application for Payment in electronic PDF format.
- I. Include the following with the application (in electronic format where applicable):
  - 1. Construction progress schedule, revised and current as specified in Section 01 3000.
  - 2. Partial release of liens from major subcontractors and vendors.
  - 3. Project record documents for review by Inspector and Architect.

#### **1.04 MODIFICATION PROCEDURES**

- A. When direction provided by the Architect or Owner appears to modify the contract scope, time, or price the following procedure shall be followed:
  - 1. The contractor shall notify the Architect in writing within three business days of receiving direction that a potential change to the above may occur.
  - 2. The contractor shall provide to the Architect within ten business days of receiving direction, a Change Order Request (COR) detailing what the modifications to the contract scope, price, or time are as well as including all relevant substantiation of costs and supporting documentation. Change Order Requests shall be on the Contractor's own form and numbered sequentially.
  - 3. If the contractor does not comply with Items 1 and 2 above, the contractor voids their ability to claim a contract modification of time and/or price.
  - 4. Within ten business days of receiving the Contractor's COR, the Architect shall respond in writing to the request.
  - 5. Once accepted, the COR shall be included in a Change Order for the Owner's approval. The Contractor can invoice for the COR once approved by the Owner.
- B. Substantiation of Costs: Provide full information required for evaluation.
  - 1. On request, provide the following data:
    - a. Quantities of products, labor, and equipment.
    - b. Taxes, insurance, and bonds.
    - c. Overhead and profit.
    - d. Justification for any change in Contract Time with updated project schedule.
    - e. Credit for deletions from Contract, similarly documented.
  - 2. Support each claim for additional costs with additional information:
    - a. Origin and date of claim.
    - b. Dates and times work was performed, and by whom.
    - c. Time records and wage rates paid.
    - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
  - 3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
    - a. Time and Material work must be authorized by the Owner or the Architect prior to commencement of work.

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- b. Time and Material verification must be reviewed and verified by the Inspector at the conclusion of each day or portion thereof.
- C. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
  - 1. Change Orders shall be invoiced once the Owner has approved and the fully executed Change Order has been provided to the Contractor.
- D. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- E. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- F. Promptly enter changes in Project Record Documents.

#### **1.05 APPLICATION FOR FINAL PAYMENT**

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
  - 1. All closeout procedures specified in Section 01 7000.
  - 2. Provide completed record drawings including all supplemental instructions, request for information, and other relevant project information. These items shall be included as a permanent part of the record drawings.

#### **PART 2 PRODUCTS - NOT USED**

#### **PART 3 EXECUTION - NOT USED**

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**SECTION 01 2100  
ALLOWANCES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Contingency allowance.

**1.02 CONTINGENCY ALLOWANCE**

- A. At closeout of Contract, funds remaining in Allowance will be credited to Owner by deductive Change Order.
- B. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in usage request authorizing expenditure of funds from this Contingency Allowance.
- C. The Contractor will prepare detailed breakdown of all costs associated with the work defined for the Allowance. These amounts will be based on final detailed payment receipts and back-up or estimates as required by Architect, and will include all direct costs of work performed under the defined work scope and will be charged against the Allowance through the Allowance Usage Request (AUR).
- D. Types of allowance scheduled herein for the Work include lump sum cash allowances. Include all allowances in Contract sum, and identify all allowances in Schedule of Values as separate line items.
- E. The Allowance is used only as directed by the Owner.
- F. The Allowance is used exclusively for the Owner's purposes and for the defined scope of work.
- G. The Contractor shall include in the base bid contract amount all cost of coordination, supervision, bond costs, insurance and all indirect project costs associated with performing the work of the Allowance.
- H. Changes that exceed the amount of each allowance will be processed as a Change Order per Contract Documents.
- I. All backup information provided for allowance usage shall include, but not be limited to:
1. Material and/or equipment rental receipts
  2. Invoices
  3. Delivery tickets
  4. Contractor and sub contractor daily reports

**1.03 ALLOWANCES SCHEDULE**

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

|                                    |             |            |
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**SECTION 01 2300  
ALTERNATES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Description of Alternates.

**1.02 ACCEPTANCE OF ALTERNATES**

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option.  
Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

**1.03 SCHEDULE OF ALTERNATES**

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

|                                    |             |            |
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**SECTION 01 2500  
SUBSTITUTION PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedural requirements for proposed substitutions.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 2300 - Alternates, for product alternatives affecting this section.
- B. Section 01 3000 - Administrative Requirements: Submittal procedures, coordination.
- C. Section 01 6000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

**1.03 DEFINITIONS**

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
  - 1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
  - 2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
    - a. Substitution requests offering advantages solely to the Contractor shall be considered on a case by case basis.

**1.04 REFERENCE STANDARDS**

- A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage); Current Edition.
- B. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase); Current Edition.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL REQUIREMENTS**

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
  - 5. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
  - 6. Contractor and sub contractors shall submit written requests for substitution or an 'equal' material, process, or article, together with substantiating data, no later than 35 days after award of the contract or at the pre-construction meeting, whichever is earlier.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
  - 1. Note explicitly any non-compliant characteristics.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
  - 1. No specific form is required. Contractor's Substitution Request documentation must include the following:

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- a. Project Information:
  - 1) Official project name and number, and any additional required identifiers established in Contract Documents.
  - 2) Owner's, Architect's, and Contractor's names.
- b. Substitution Request Information:
  - 1) Discrete and consecutive Substitution Request number, and descriptive subject/title.
  - 2) Indication of whether the substitution is for cause or convenience.
  - 3) Issue date.
  - 4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
  - 5) Description of Substitution.
  - 6) Reason why the specified item cannot be provided.
  - 7) Differences between proposed substitution and specified item.
  - 8) Description of how proposed substitution affects other parts of work.
- c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
  - 1) Physical characteristics.
  - 2) In-service performance.
  - 3) Expected durability.
  - 4) Visual effect.
  - 5) Sustainable design features.
  - 6) Warranties.
  - 7) Other salient features and requirements.
  - 8) Include, as appropriate or requested, the following types of documentation:
    - (a) Product Data:
    - (b) Samples.
    - (c) Certificates, test, reports or similar qualification data.
    - (d) Drawings, when required to show impact on adjacent construction elements.
- d. Impact of Substitution:
  - 1) Savings to Owner for accepting substitution.
  - 2) Change to Contract Time due to accepting substitution.
- D. Limit each request to a single proposed substitution item.
  - 1. Submit an electronic document, combining the request form with supporting data into single document.
- E. Substitutions affecting DSA regulated items shall be considered an Addendum or Construction Change Document and shall be approved prior to fabrication or procurement of substituted product.
  - 1. All addenda shall be signed by the Architect of Record and approved by DSA.
  - 2. All Construction Change Documents (CCD's) shall be signed by the Architect of Record, Structural Engineer (where applicable), and delegated professional engineer (where applicable). CCD's shall be reviewed and approved by DSA prior to fabrication, procurement, and installation of substituted product.

### **3.02 SUBSTITUTION PROCEDURES DURING CONSTRUCTION**

- A. Architect will consider requests for substitutions only within 15 days after date of Agreement.
- B. Submit request for Substitution for Cause immediately upon discovery of need for substitution, but not later than 14 business days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
- C. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 business days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

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1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
3. Bear the costs engendered by proposed substitution of:
  - a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
  - b. Other construction by Owner.
  - c. Other unanticipated project considerations.
- D. Substitutions will not be considered under one or more of the following circumstances:
  1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
  2. Without a separate written request.

### **3.03 RESOLUTION**

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request.
  1. Architect's decision following review of proposed substitution will be noted on the submitted form.

### **3.04 ACCEPTANCE**

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

### **3.05 CLOSEOUT ACTIVITIES**

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

**SECTION 01 3000  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Submittals for review, information, and project closeout.
- G. Number of copies of submittals.
- H. Requests for Information (RFI) procedures.
- I. Submittal procedures.
- J. Punch walk and associated punch list procedures.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 6000 - Product Requirements: General product requirements.
- B. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.
- C. Section 01 7800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

**1.03 GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. Conform to requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
  - 1. Construction and Progress Schedule
  - 2. Digital Photo Documentation of the Project Site and Adjacent Areas
  - 3. Corner Records of all Survey Monuments Tie-Out in or Near the Work Area (if Surveying is to be Provided by the Contractor)
  - 4. Specifications and Certifications for Each Material or Item to be Used on the Project
  - 5. Traffic Control Plans
  - 6. Illness and Injury Prevention Program Plan
  - 7. Schedule of Values for all Lump Sum Bid Items
  - 8. Staff Names with a list of staff assignments, including superintendent and other personnel in attendance at project site. (Identify individuals and their duties and responsibilities; list addressess and telephone numbers, including home and office telephone numbders)
  - 9. All Permits and Contractor Licenses
  - 10. Confined Space Entry Program and Shoring Plan, (if Required)
  - 11. Sewer Spill Prevention Plan, (if Required)
  - 12. Cut Sheet/Shop Drawings, Manufacturers Brochures, Technical Bulletins and Reports, Specifications, Diagrams for all Products to be Used on the Project
  - 13. Plans, Schematics, Drawings and Engineering Calculations as Required per the Contract Documents and/or Permitting
  - 14. SWPPP (if Required)
  - 15. Data, including, but not limited to, catalog sheets, manufacturers brochures, technical bulletins, specifications, diagrams, product samples, and other information necessary to describe a system, product or item. This information is required for irrigation systems, lighting systems, and may also be required for any product, manufactured item, or system.

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| Electric Upgrades at Vista Academy | 01 3000 - 1 | Administrative Requirements |
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16. Requests for Information
17. Requests for Substitution
18. Applications for payment and change order requests
19. Correction Punch List and Final Correction Punch List for Substantial Completion
20. Closeout Documents (Warranties, O&M Manuals, Etc.)

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 PRECONSTRUCTION MEETING**

- A. Architect will schedule a meeting after Notice to Proceed.
- B. Attendance Required:
  1. Owner.
  2. Architect.
  3. Contractor.
  4. Inspector.
  5. Bond Program Manager.
  6. School Site Representative.
- C. Agenda:
  1. Designation of Contractor's personnel for the project.
  2. 24 hour emergency contact information for Contractor and Owner.
  3. List of all sub contractors regardless of percentage of work.
  4. Construction CPM Schedule
  5. Copy of Public Notification/Door Hangers
  6. Digital photo documentation of project site and adjacent area. This item can be processed as a formal project submittal.
  7. Traffic control plan
  8. Illness and injury prevention plan
  9. Confined space entry program (if required)
  10. Shoring plan (if required)
  11. Sewer spill prevention plan (if required)
  12. SWPPP
  13. Schedule of values for all lump sum bid items. This item can be processed as a formal submittal.
  14. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  15. Example pay application showing conformance to Owner requirements.

### **3.02 PROGRESS MEETINGS**

- A. Architect will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required:
  1. Contractor.
  2. Owner.
  3. Architect.
  4. Contractor's superintendent.
  5. Major subcontractors.
  6. Inspector.
- C. Agenda:
  1. Review minutes of previous meetings.
  2. Review of work progress.
    - a. Contractor shall provide a three week look ahead schedule projecting upcoming work activities.

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3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of RFIs log and status of responses.
7. Review of off-site fabrication and delivery schedules.
8. Corrective measures to regain projected schedules.
9. Coordination of projected progress.
10. Maintenance of quality and work standards.
11. Effect of proposed changes on progress schedule and coordination.
12. Other business relating to work.

### **3.03 CONSTRUCTION PROGRESS SCHEDULE (CPM SCHEDULE) - SEE SECTION 01 3216**

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
  1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

### **3.04 REQUESTS FOR INFORMATION(RFI)**

- A. Definition: A request seeking one of the following:
  1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in the Contract Documents.
  2. A resolution to an issue which has arisen due to field conditions and affects design intent.
  3. Confirmation of previous discussions between Architect and Contractor resulting in a resolution to an on site issue. Confirming RFI's should only be submitted after mutual agreement by Architect and Contractor.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  1. Prepare a separate RFI for each specific item.
    - a. Do not forward requests which solely require internal coordination between subcontractors.
  2. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
  1. Include in each request Contractor's signature attesting to good faith effort to determine from the Contract Documents information requiring interpretation.
  2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
    - a. Approval of submittals (use procedures specified elsewhere in this section).
    - b. Approval of substitutions (see Section - 01 6000 - Product Requirements)
    - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
    - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
  3. Improper RFIs: Requests not prepared in conformance to requirements of this section, and/or missing key information required to render an actionable response. They will be

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- returned without a response, with an explanatory notation.
4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question. They will be returned without a response.
    - a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
    - b. Multiple versions of the same RFI submitted without new or relevant information shall be considered frivolous and will be returned without a response.
- D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
1. Official Project name and number, and any additional required identifiers established in Contract Documents.
  2. Owner's, Architect's, and Contractor's names.
  3. Discrete and consecutive RFI number, and descriptive subject/title.
  4. Issue date, and requested reply date.
  5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
  6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
  7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Indicate current status of every RFI. Update log promptly and on a regular basis.
  2. Note dates of when each request is made, and when a response is received.
  3. Highlight items requiring priority or expedited response.
  4. Highlight items for which a timely response has not been received to date.
  5. Identify and include improper or frivolous RFIs.
- G. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
  2. RFIs that require additional input from Architect's consultants may require additional review time.
- H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner and Architect.
1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
  2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
  3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.

4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

### **3.05 SUBMITTAL SCHEDULE**

- A. Submit to Architect for review a schedule for submittals in tabular format.
  1. Submit at the same time as the preliminary schedule specified in Section - 01 3216 - Construction Progress Schedule.
  2. Coordinate with Contractor's construction schedule and schedule of values.
  3. Format schedule to allow tracking of status of submittals throughout duration of construction.
  4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
  5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
    - a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

### **3.06 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  1. Product data.
  2. Shop drawings.
  3. Samples for selection.
  4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

### **3.07 SUBMITTALS FOR INFORMATION**

- A. When the following are specified in individual sections, submit them for information:
  1. Design data.
  2. Certificates.
  3. Test reports.
  4. Inspection reports.
  5. Manufacturer's instructions.
  6. Manufacturer's field reports.
  7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

### **3.08 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in conformance to requirements of Section 01 7800 - Closeout Submittals:
  1. Project record documents.
  2. Operation and maintenance data.
  3. Warranties.
  4. Bonds.

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5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

### **3.09 NUMBER OF COPIES OF SUBMITTALS**

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
  1. After review, produce duplicates.
  2. Retained samples will not be returned to Contractor unless specifically so stated.

### **3.10 SUBMITTAL PROCEDURES**

- A. General Requirements:
  1. Use a separate transmittal for each item.
  2. Transmit using approved form.
    - a. Use Contractor's form, subject to prior approval by Architect.
  3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
  4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
  5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
    - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
  6. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    - a. Send submittals in electronic format via email to Architect.
  7. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
    - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
    - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days minimum.
  8. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
  9. Provide space for Contractor and Architect review stamps.
  10. When revised for resubmission, identify all changes made since previous submission.
  11. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
  12. Submittals not requested will not be recognized or processed.
- B. Product Data Procedures:
  1. Submit only information required by individual specification sections.
  2. Collect required information into a single submittal.
  3. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
  1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related work.
  2. Do not reproduce the Contract Documents to create shop drawings.
  3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

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- D. Samples Procedures:
  - 1. Transmit related items together as single package.
  - 2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

### 3.11 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
  - 1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.
- D. Architect's and consultants' actions on items submitted for review:
  - 1. Authorizing purchasing, fabrication, delivery, and installation:
    - a. "No Exceptions Taken", or language with same legal meaning.
    - b. "Make Corrections Noted, Resubmittal Not Required", or language with same legal meaning.
      - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
  - 2. Not Authorizing fabrication, delivery, and installation:
    - a. "Revise and Resubmit".
      - 1) Resubmit revised item, with review notations acknowledged and incorporated.
      - 2) Non-responsive resubmittals may be rejected.
    - b. "Rejected".
      - 1) Submit item complying with requirements of Contract Documents.
- E. Architect's and consultants' actions on items submitted for information:
  - 1. Items for which no action was taken:
    - a. "Received" - to notify the Contractor that the submittal has been received for record only.
  - 2. Items for which action was taken:
    - a. "Reviewed" - no further action is required from Contractor.

### 3.12 PUNCH LIST

- A. Contractor's requirements for punch list: Prior to requesting the Architect to perform the final punch walk, the Contractor shall meet the following requirements:
  - 1. List of Incomplete Items: The Contractor shall furnish a comprehensive list of items that are not anticipated to be complete at the time of the Architect's punch walk.
  - 2. Contractor's Pre-Punch List: The Contractor shall furnish a comprehensive pre-punch list for review prior to the Architect's punch walk. The Contractor's list shall include corrective items identified by the Contractor during their internal pre-punch walk. The list shall also include the date each item was addressed by the Contractor. The Contractor's pre-punch list shall be completed in full prior to the Architect performing their punch walk.
  - 3. Scheduling of Architect's Final Punch Walk: Once the above items have been completed and submitted to the Architect for review, the Contractor shall schedule the Architect's final punch walk. The final punch walk shall be coordinated and scheduled by the Contractor with the Architect a minimum of 21 calendar days prior to the contract completion date or as previously agreed upon.
- B. Architect's punch walk:
  - 1. Once scheduled, the Architect and their required consultants will perform a final punch walk of the project. At the conclusion of the walk the Architect and consultants shall provide a punch list indicating deficient items. This list is not all encompassing and does

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- not relieve the Contractor of any contractual requirements as it relates to the project.
2. The Architect's punch list should not be considered a 'list to complete' as it is the Contractor's responsibility to ensure all items are completed prior to scheduling the punch walk. The Architect, at their discretion, may terminate the punch walk if it is determined that the project is not complete.
  3. The Architect shall issue the final punch list to the Contractor within 14 calendar days of the punch walk or as previously agreed upon.
  4. Once the Contractor has addressed all items on the Architect's punch list, the Contractor shall submit a verified punch list that includes the following minimum items:
    - a. Corrective measures taken to address the item.
    - b. Date of when the corrective measures were verified as being completed by the Contractor.
    - c. Initials of the Contractor who verified the completed corrective measures.
  5. At the Architect's discretion a punch list verification walk shall be conducted to confirm the punch list items have been addressed.

**SECTION 01 3216  
CONSTRUCTION PROGRESS SCHEDULE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type, Critical Path Method, CPM, cost loaded schedule

**1.02 REFERENCE STANDARDS**

- A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.
- B. M-H (CPM) - CPM in Construction Management - Project Management with CPM; O'Brien; 2006.

**1.03 SUBMITTALS**

- A. Within 10 days after date established in Notice to Proceed, submit preliminary schedule.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
- D. Within 10 days after joint review, submit complete schedule identifying start and completion dates.
  - 1. Submit a minimum of two printed copies large enough to display the entire schedule for the complete construction period on a single page.
- E. Submit updated schedule with each Application for Payment or monthly.
- F. Submit in PDF format.

**1.04 QUALITY ASSURANCE**

- A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

**1.05 SCHEDULE FORMAT**

- A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
- B. Scale and Spacing: To allow for notations and revisions.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRELIMINARY SCHEDULE**

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

**3.02 CONTENT**

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Identify work of separate stages and other logically grouped activities.
- D. Provide sub-schedules to define critical portions of the entire schedule.
- E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

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- F. Provide separate schedule of submittal dates for shop drawings, product data, and samples, products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.
- G. Coordinate content with schedule of values specified in Section 01 2000 - Price and Payment Procedures.
- H. Provide legend for symbols and abbreviations used.

### **3.03 BAR CHARTS**

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first work day of each week.

### **3.04 NETWORK ANALYSIS**

- A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.
- B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.
- C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
  - 1. Preceding and following event numbers.
  - 2. Activity description.
  - 3. Estimated duration of activity, in maximum 15 day intervals.
  - 4. Earliest start date.
  - 5. Earliest finish date.
  - 6. Actual start date.
  - 7. Actual finish date.
  - 8. Latest start date.
  - 9. Latest finish date.
  - 10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
  - 11. Monetary value of activity, keyed to Schedule of Values.
  - 12. Percentage of activity completed.
  - 13. Responsibility.
- D. Required Reports: List activities in sorts or groups:
  - 1. By preceding work item or event number from lowest to highest.
  - 2. By amount of float, then in order of early start.

### **3.05 REVIEW AND EVALUATION OF SCHEDULE**

- A. Evaluate project status to determine work behind schedule and work ahead of schedule.
- B. After review, revise as necessary as result of review, and resubmit within 10 days.

### **3.06 UPDATING SCHEDULE**

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.
- G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

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### 3.07 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

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**SECTION 01 3553  
SECURITY PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Security measures including entry control, personnel identification, miscellaneous restrictions, and entry and exit control, personnel identification, protective devices, and miscellaneous restrictions.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 1000 - Summary: use of premises and occupancy.
- B. Section 01 5000 - Temporary Facilities and Controls: Temporary lighting.

**1.03 SECURITY PROGRAM**

- A. Protect Work , existing premises and Owner's operations from theft, vandalism, and unauthorized entry.
- B. Initiate program at project mobilization.
- C. Maintain program throughout construction period until Owner acceptance precludes the need for Contractor security.

**1.04 ENTRY CONTROL**

- A. Restrict entrance of persons and vehicles into Project site .
- B. Allow entrance only to authorized persons with proper identification.
- C. Maintain log of workers and visitors, make available to Owner on request.

**1.05 PERSONNEL IDENTIFICATION**

- A. Provide identification badge to each person authorized to enter premises.
- B. Badge To Include: Personal photograph, name and employer.
- C. Maintain a list of accredited persons, submit copy to Owner on request.
- D. Require return of badges at expiration of their employment on the Work.

**1.06 RESTRICTIONS**

- A. Do no work on Sundays unless previously authorized by Owner, in the event the work is ordered by the Owner and there is written direction specifically authorizing Sunday work.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**SECTION 01 4000  
QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittals.
- B. Quality assurance.
- C. Testing and inspection agencies and services.
- D. Control of installation.
- E. Mock-ups.
- F. Tolerances.
- G. Defect Assessment.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 3000 - Administrative Requirements: Submittal procedures.

**1.03 DEFINITIONS**

- A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.
  - 1. Contractor to submit to Owner, Inspector, and Architect detailed quality control plan prior to initiation of construction activities onsite.

**1.04 TESTING AND INSPECTION AGENCIES AND SERVICES**

- A. The Project Inspector and testing lab shall be employed by the Owner and approved by the Architect of Record, Structural Engineer of Record (where applicable), delegated professional engineer (where applicable), and DSA.

**PART 3 EXECUTION**

**2.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

**2.02 MOCK-UPS**

- A. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear

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area when directed to do so by Architect.

### **2.03 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

### **2.04 TESTING AND INSPECTION**

- A. Testing Agency Duties:
  - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
  - 2. Perform specified sampling and testing of products in accordance with specified standards.
  - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
  - 5. Perform additional tests and inspections required by Architect.
  - 6. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
  - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency may not approve or accept any portion of the Work.
  - 3. Agency may not assume any duties of Contractor.
  - 4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
  - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  - 3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  - 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  - 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
  - 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

### **2.05 DEFECT ASSESSMENT**

- A. Replace Work or portions of the Work not complying with specified requirements.

**SECTION 01 5000  
TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary utilities.
- B. Temporary telecommunications services.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers, enclosures, and fencing.
- E. Security requirements.
- F. Vehicular access and parking.
- G. Waste removal facilities and services.
- H. Project identification sign.
- I. Field offices.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 5100 - Temporary Utilities.
- B. Section 01 5213 - Field Offices and Sheds.
- C. Section 01 5500 - Vehicular Access and Parking.

**1.03 TEMPORARY UTILITIES - SEE SECTION 01 5100**

- A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.

**1.04 TELECOMMUNICATIONS SERVICES**

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
  - 1. Temporary telephone service in common-use facilities for use by all construction personnel.
  - 2. Install one telephone line for each field office.
  - 3. Provide a list of important telephone numbers including police and fire departments, contractor's main office, architect's office, owner's office, and primary sub contractors main office.
  - 4. Provide superintendent with cellular telephone or portable two-way radio when away from field office.

**1.05 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
  - 1. Provide temporary toilets, wash facilities, and drinking water for use by construction personnel. Comply with authority having jurisdiction regarding type, quantity and maintenance of fixtures and facilities.
- B. Maintain daily in clean and sanitary condition.

**1.06 BARRIERS**

- A. Provide barriers with sound proofing to prevent unauthorized entry to construction areas as well as mitigate noise pollution into the active school site and public right away. Barrier should be constructed to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

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- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

#### **1.07 FENCING**

- A. Provide 6 foot (1.8 m) high fence with steel pipe posts and galvanized steel base for supporting posts. Posts to be a minimum 2-3/8" OD line posts, 2-7/8" OD corner and pull posts, and 1-5/8" OD top and bottom rails.
- B. Fencing to be located around construction site and equipped with vehicular and pedestrian gates with locks.
- C. Provide screen on all temporary construction fence panles to limit the visibility of the construction site from the public.
- D. Minimum 2 inch, 9 gauge galvanized steel, chain link fencing fabric.

#### **1.08 INTERIOR ENCLOSURES**

- A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:

#### **1.09 SECURITY - SEE SECTION 01 3553**

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

#### **1.10 VEHICULAR ACCESS AND PARKING - SEE SECTION 01 5500**

- A. Coordinate access and haul routes with governing authorities and Owner.
- B. Provide and Maintain access to all fire lanes and fire hydrants, free of obstruction, during all construction activities.
- C. Provide means of removing mud from vehicle wheels before entering streets.
- D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

#### **1.11 WASTE REMOVAL**

- A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.
- B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- C. Provide containers with lids. Remove trash from site periodically.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

#### **1.12 PROJECT IDENTIFICATION**

- A. Provide project identification sign of design and construction indicated on drawings.
- B. Erect on site at location indicated.
- C. No other signs are allowed without Owner permission except those required by law.

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| Electric Upgrades at Vista Academy | 01 5000 - 2 | Temporary Facilities and Controls |
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### **1.13 FIELD OFFICES - SEE SECTION 01 5213**

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate 8 persons.
- C. Provide separate field office for Inspector of Record.
- D. Provide separate field office for Bond Program Manager.
- E. Locate offices a minimum distance of 30 feet (10 m) from existing and new structures.

### **1.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION - NOT USED**

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**SECTION 01 5100  
TEMPORARY UTILITIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary Utilities: Provision of electricity and water.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 5000 - Temporary Facilities and Controls:

**1.03 TEMPORARY ELECTRICITY**

- A. Cost: By Contractor.
- B. Provide power service required from utility source.
- C. Provide temporary electric feeder from existing building electrical service at location as directed.

**1.04 TEMPORARY WATER SERVICE**

- A. Cost of Water Used: By Contractor.
- B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.
- C. Temporary water service for fire protection shall be installed prior to combustibles arriving onsite.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

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| Electric Upgrades at Vista Academy | 01 5100 - 1 | Temporary Utilities |
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**SECTION 01 5213  
FIELD OFFICES AND SHEDS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary field offices for use of Contractor.
- B. Maintenance and removal.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 1000 - Summary: use of premises and responsibility for providing field offices.
- B. Section 01 5000 - Temporary Facilities and Controls:
- C. Section 01 5500: Parking and access to field offices.

**PART 2 PRODUCTS**

**2.01 CONSTRUCTION**

- A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
- B. Construction: Structurally sound, secure, weather tight enclosures for office. Maintain during progress of Work; remove when no longer needed.
- C. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy requirements.
- D. Exterior Materials: Weather resistant, finished in one color.
- E. Interior Materials in Offices: Sheet type materials for walls and ceilings, prefinished or painted; resilient floors and bases.
- F. Lighting for Offices: 50 fc (538 lx) at desk top height, exterior lighting at entrance doors.
- G. Fire Extinguishers: Appropriate type fire extinguisher at each office.

**2.02 ENVIRONMENTAL CONTROL**

- A. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions.

**2.03 CONTRACTOR OFFICE AND FACILITIES**

- A. Size: For Contractor's needs and to provide space for project meetings.
- B. Furnishings in Meeting Area: Conference table and chairs to seat at least eight persons; racks and files for Contract Documents, submittals, and project record documents.
- C. Other Furnishings: Contractor's option.
- D. Equipment: Six adjustable band protective helmets for visitors, one 10 inch (250 mm) outdoor weather thermometer and six high visibility construction vests for visitors.

**2.04 DISTRICT CONSTRUCTION MANAGER/INSPECTOR OFFICE**

- A. The Contractor shall provide the following furnishings for a 40' site office trailer: 4 desks, 4 chairs, 2 drawing layout tables, interior hand wash sink 2 (30" by 84") folding tables or conference table that accommodate seating for 12 people, 4 filing cabinets (4 drawer legal size), 16 stackable meeting chairs, 1 refrigerator minimum (5 ft3), 1 microwave minimum (2x2) mid-size, 2 (6 ft high x 3 ft wide x 1 ft deep) bookcases, 5 gallon size hot/cold water cooler with 4ea 5gal bottle per month water service, 12 cup coffee maker, Install articulated flat screen monitor at conference table, windows with mesh security screens and bars, door entrance complete with a suitable lock, minimum ten (10) 120 volt, ac duplex electrical receptacles, Internet service, Office printer/scanner with a stapling feature, and capable of printing 11"x17", 2 each VIP restrooms with locks serviced minimum once a week, and weekly janitorial cleaning services for IOR/ District CM field office. All items should be included for the duration of the project.

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| Electric Upgrades at Vista Academy | 01 5213 - 1 | Field Offices and Sheds |
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## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Fill and grade sites for temporary structures to provide drainage away from buildings.

### **3.02 INSTALLATION**

- A. Install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed.

### **3.03 MAINTENANCE AND CLEANING**

- A. Weekly janitorial services for offices; periodic cleaning and maintenance for offices.
- B. Maintain approach walks free of mud, water, and snow.

### **3.04 REMOVAL**

- A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

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| Electric Upgrades at Vista Academy | 01 5213 - 2 | Field Offices and Sheds |
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**SECTION 01 5500  
VEHICULAR ACCESS AND PARKING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Parking.
- B. Existing pavements and parking areas.
- C. Flag persons.
- D. Maintenance.
- E. Removal, repair.
- F. Mud from site vehicles.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 1000 - Summary: For access to site, work sequence, and occupancy.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Temporary Construction: Contractor's option.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

**3.02 PARKING**

- A. Use of designated areas of existing parking facilities by construction personnel is permitted.
- B. Arrange for temporary parking areas to accommodate use of construction personnel.
- C. When site space is not adequate, provide additional off-site parking.
- D. Locate as approved by Owner and identified in Contractor's approved logistics plan.

**3.03 FLAG PERSONS**

- A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

**3.04 MAINTENANCE**

- A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
- B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

**3.05 REMOVAL, REPAIR**

- A. Repair existing facilities damaged by use, to original condition.
- B. Repair damage caused by installation.

**3.06 MUD FROM SITE VEHICLES**

- A. Provide means of removing mud from vehicle wheels before entering streets. Identify system on Contractor's logistics plan.

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| Electric Upgrades at Vista Academy | 01 5500 - 1 | Vehicular Access and Parking |
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**SECTION 01 6000  
PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Procedures for Owner-supplied products.
- G. Maintenance materials, including extra materials, spare parts, tools, and software.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 1000 - Summary: Lists of products to be removed from existing building.
- B. Section 01 2500 - Substitution Procedures: Substitutions made during and after the Bidding/Negotiation Phase.

**1.03 SUBMITTALS**

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

**PART 2 PRODUCTS**

**2.01 EXISTING PRODUCTS**

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.
- C. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is not prohibited, unless noted otherwise.
  - 1. If reuse of other existing materials or equipment is desired, submit substitution request.

**2.02 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. Where all other criteria are met, Contractor shall give preference to products that:
  - 1. If used on interior, have lower emissions, as defined in Section 01 6116.
  - 2. If wet-applied, have lower VOC content, as defined in Section 01 6116.
  - 3. Have a published GreenScreen Chemical Hazard Analysis.

**2.03 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

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- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

#### **2.04 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

### **PART 3 EXECUTION**

#### **3.01 SUBSTITUTION LIMITATIONS**

- A. See Section 01 2500 - Substitution Procedures.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- C. A request for substitution constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension that may subsequently become apparent.

#### **3.02 OWNER-SUPPLIED PRODUCTS**

- A. Owner's Responsibilities:
  - 1. Arrange and pay for product delivery to site.
  - 2. On delivery, inspect products jointly with Contractor.
  - 3. Submit claims for transportation damage and replace damaged, defective, or deficient items.
  - 4. Arrange for manufacturers' warranties, inspections, and service.
- B. Contractor's Responsibilities:
  - 1. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
  - 2. Handle, store, install and finish products.
  - 3. Repair or replace items damaged after receipt.

#### **3.03 TRANSPORTATION AND HANDLING**

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

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| Electric Upgrades at Vista Academy | 01 6000 - 2 | Product Requirements |
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- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

#### **3.04 STORAGE AND PROTECTION**

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**SECTION 01 7000  
EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Cutting and patching.
- D. Surveying for laying out the work.
- E. Cleaning and protection.
- F. Starting of systems and equipment.
- G. Demonstration and instruction of Owner personnel.
- H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- I. General requirements for maintenance service.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 5000 - Temporary Facilities and Controls: Temporary exterior enclosures.
- C. Section 01 5000 - Temporary Facilities and Controls: Temporary interior partitions.
- D. Section 01 7900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections
- E. Section 07 8400 - Firestopping.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
  - 1. On request, submit documentation verifying accuracy of survey work.
  - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
  - 3. Submit surveys and survey logs for the project record.
  - 4. Final property survey
    - a. Submit two hardcopies, one CAD file, and one PDF showing the work performed and record survey data.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
  - 1. Structural integrity of any element of Project.
  - 2. Integrity of weather exposed or moisture resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - 4. Visual qualities of sight exposed elements.
  - 5. Work of Owner or separate Contractor.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities.

**1.04 QUALIFICATIONS**

- A. For demolition work, employ a firm specializing in the type of work required.
  - 1. Minimum of 5 years of documented experience.
- B. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions

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insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

- C. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

#### **1.05 PROJECT CONDITIONS**

- A. Use of explosives is not permitted, unless approved prior by Owner and Architect.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
  - 1. Minimize amount of bare soil exposed at one time.
  - 2. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
  - 1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.
- H. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- I. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

#### **1.06 COORDINATION**

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
  - 1. Coordinate scheduling of loud and heavy construction work with the Owner to minimize disturbance during standardized testing and other blocks of time in which the site will conduct such activities. Site bell and testing schedule will be provided to Contractor for scheduling purposes.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.

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- G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

## **PART 2 PRODUCTS**

### **2.01 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

### **3.02 PREPARATION**

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

### **3.03 LAYING OUT THE WORK**

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction. Existing Survey control points damaged by the contractor shall be restored by the Contractor at no additional cost to the District.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.

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2. Grid or axis for structures.
  3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

### 3.04 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

### 3.05 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  1. Verify that construction and utility arrangements are as indicated.
  2. Report discrepancies to Architect before disturbing existing installation.
  3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
  1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 .
  2. Provide sound retardant partitions between areas of alteration work and areas occupied by Owner during construction.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
  1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
  2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- D. Remove existing work as indicated **and** as required to accomplish new work.
  1. Remove items indicated on drawings.
  2. Relocate items indicated on drawings.
  3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
  4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
  5. The contractor is responsible to perform all demolition work necessary to allow execution of all requirements of the new construction.
    - a. Elements not specifically noted for demolition shall be removed by the contractor in order to facilitate all requirements of the new construction.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
  1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment

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- as required.
- 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
  - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
  - b. Provide temporary connections as required to maintain existing systems in service.
  - c. Provide Owner with 72 hour minimum notification before existing systems taken off line.
- 4. Verify that abandoned services serve only abandoned facilities.
- 5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- F. Protect existing work to remain.
  - 1. Prevent movement of structure; provide shoring and bracing if necessary.
  - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
- G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
  - 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
  - 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
  - 3. Where a change of plane of 1/4 inch (6 mm) or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
- H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- I. Refinish existing surfaces as indicated:
  - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
  - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- J. Clean new and existing systems and equipment as necessary.
- K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- L. Do not begin new construction in alterations areas before demolition is complete.
- M. Comply with all other applicable requirements of this section.

### **3.06 CUTTING AND PATCHING**

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
  - 1. Complete the work.
  - 2. Fit products together to integrate with other work.
  - 3. Provide openings for penetration of mechanical, electrical, and other services.
  - 4. Match work that has been cut to adjacent work.
  - 5. Repair areas adjacent to cuts to required condition.

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6. Repair new work damaged by subsequent work.
  7. Remove samples of installed work for testing when requested.
  8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
  - E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
  - F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
  - G. Restore work with new products in accordance with requirements of Contract Documents.
  - H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
  - I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.
  - J. Patching:
    1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
    2. Match color, texture, and appearance.
    3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

### **3.07 PROGRESS CLEANING**

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

### **3.08 PROTECTION OF INSTALLED WORK**

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.
- G. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

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### **3.09 SYSTEM STARTUP**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect and Owner seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

### **3.10 DEMONSTRATION AND INSTRUCTION**

- A. See Section 01 7900 - Demonstration and Training.
- B. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.
- C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

### **3.11 ADJUSTING**

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

### **3.12 FINAL CLEANING**

- A. Final interior cleaning prior to architect's Punch walk and for Owner occupancy shall consist of full and thorough cleaning using appropriate non-marring cleaners for all areas of the building, all accessible equipment and all visible building components. All protective coverings and coatings shall be removed along with adhesive residues. All concrete and tile floors shall be mopped and left free of water or cleaner residue. Glass and painted surfaces shall be cleaned free of fingerprints, smudges and non-code-required labels and stickers. Machine scrub ceramic flooring. Clean all thresholds. Clean all millwork. Clean horizontal surfaces. Dust and wipe down walls. Clean all mirrors, restrooms, storage rooms, concession, custodial, ticket room, and lobby. Clean all furniture. Clean all fixtures. Visible air shaft louvers, grilles and registers dusted.
- B. Provide adequate manpower to complete work in multiple buildings concurrently as required. Review cleaning and maintenance instructions for installed material prior to cleaning.
- C. Furnish all labor, material and equipment to complete all final cleaning of the work as described in the contract documents.
- D. Sweep paved areas broom clean and Powerwash all exterior concrete sidewalks, curbs, asphalt, parking lots. Remove stains, spills and other foreign deposits.
- E. Fire cabinets cleaned inside and out.
- F. Complete/detailed vacuum and spot removal of all wall-coverings throughout the building.
- G. Clean all closets including janitor closets, mop sinks, plumbing fixtures and floor sinks.

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- H. Wax all VCT and sheet vinyl. Use proper products per specification and manufacturer requirements.
- I. All ceramic tiles wiped clean using special cleaning materials for best reflection.
- J. All toilet partitions and accessories wiped clean.
- K. All stainless steel kitchen cabinets, countertops and appliances wiped clean.
- L. Clean and polish transparent materials, including mirrors and glass in doors and windows including frames.
- M. Restore reflection surfaces to their original reflection condition.
- N. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances.
- O. Clean plumbing fixtures to a sanitary condition.
- P. All shades, storefront, rolling shutters and coiling doors wiped down inside and out.
- Q. General roof clean-up.
- R. Clean tops, sides and bottoms (if accessible) of equipment.
- S. Remove labels that are not permanent. Do not remove permanent labels (UL, WH, etc.)
- T. Wipe clean any exposed duct, pipe and conduit.
- U. Exterior cleaning shall include washing all windows, exposed metal and stone surfaces, removing any stains from exterior plaster, wash down of roof equipment wells and cleaning roof mounted equipment and all rain gutters shall be cleared of any obstructions.
- V. One (1) pre-punch clean prior to Architect's punch walk and one (1) final clean prior to Owner occupancy.
- W. Clean all windows and mullions interior and exterior. Remove drywall texture where required.
- X. Clean all restrooms complete including all plumbing fixtures, electrical fixtures, toilet partitions and accessories. Remove any and all temporary protection and labels not required to remain. Clean and shine hardware. Clean all mirrors. Clean all floor and wall tile.
- Y. Sweep and mop all floors.
- Z. Vacuum all carpeted areas and wipe base. Spot clean carpet as needed.
- AA. Clean all casework and cabinetry inside and out.
- BB. Clean all doors, jambs and hardware. Remove drywall texture where required.
- CC. Clean all exit signs
- DD. Clean all plumbing fixtures, lighting fixtures and any other wall or ceiling mounted fixtures/devices.
- EE. Clean interior of wheelchair lift.
- FF. Remove temporary floor protection.
- GG. Dust walls and wall coverings.
- HH. Clean all vinyl tack panel. This includes heavy cleaning to remove stains.
- II. Clean all countertops.
- JJ. Clean all interior and exterior light fixtures.
- KK. Clean exposed piping as required.
- LL. Provide additional touch up cleaning as required prior to owner occupancy. Contractor shall include final touch-up of stained plaster at Building exteriors due to weather, soil staining, or any other staining seen on Buildings.
- MM. Clean all other permanent items shown in the plans.

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- NN. Power wash all exterior hard surfaces around buildings that contain work on the project.
- OO. Multiple move-ons as required for the phased schedule to achieve final cleaning scope of work.

### **3.13 CLOSEOUT PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
- B. Notify Architect when work is considered complete and ready for Architect's Punch List.
- C. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete (including all Punch List items) in accordance with Contract Documents and ready for Architect's Substantial Completion review.
- D. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- E. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

### **3.14 MAINTENANCE**

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

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**SECTION 01 7419  
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

**PART 1 GENERAL**

**1.01 WASTE MANAGEMENT REQUIREMENTS**

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports. The Contractor shall submit copies of fully signed hazardous material disposal manifests to the District.
- E. Methods of trash/waste disposal that are not acceptable are:
  - 1. Burning on the project site.
  - 2. Burying on the project site.
  - 3. Dumping or burying on other property, public or private.
  - 4. Other illegal dumping or burying.
- F. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

**1.02 DEFINITIONS**

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

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- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

### 1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Contractor to submit for review a Waste Management Plan. The waste management plan shall be an outline of the items required for the Waste Disposal Reports as indicated below. The waste management plan shall be submitted for review prior to the start of construction.
- C. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
  - 1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
  - 2. Submit Report on a form acceptable to Owner.
  - 3. Report shall contain contact information for the waste management company that can provide verifiable documentation of the percentages of construction and demolition waste diverted from the landfill.
  - 4. Landfill Disposal: Include the following information:
    - a. Identification of material.
    - b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project disposed of in landfills.
    - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
    - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
  - 5. Incinerator Disposal: Include the following information:
    - a. Identification of material.
    - b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project delivered to incinerators.
    - c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
    - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
  - 6. Recycled and Salvaged Materials: Include the following information for each:
    - a. Identification of material, including those retrieved by installer for use on other projects.
    - b. Amount, in tons or cubic yards (cubic meters), date removed from the project site, and receiving party.
    - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
    - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
    - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
  - 7. Material Reused on Project: Include the following information for each:
    - a. Identification of material and how it was used in the project.
    - b. Amount, in tons or cubic yards (cubic meters).
    - c. Include weight tickets as evidence of quantity.
  - 8. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

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## **PART 3 EXECUTION**

### **2.01 WASTE MANAGEMENT PROCEDURES**

- A. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.
- C. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.
- D. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

### **2.02 WASTE MANAGEMENT PLAN IMPLEMENTATION**

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
  - 1. Prebid meeting.
  - 2. Preconstruction meeting.
  - 3. Regular job-site meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
  - 1. Provide containers as required.
  - 2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
  - 3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

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**SECTION 01 7800  
CLOSEOUT SUBMITTALS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Individual Product Sections: Specific requirements for operation and maintenance data.
- C. Individual Product Sections: Warranties required for specific products or Work.

**1.03 SUBMITTALS**

- A. Project Record Documents: Submit documents to Architect prior to submission of final Application of Payment.
- B. Operation and Maintenance Data:
  - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
  - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
  - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned, with Architect comments. Revise content of all document sets as required prior to final submission.
  - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
  - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
    - a. Approved Change Order shall be made a permanent part of the record drawings.
    - b. Allowance Usage Requests shall be made a permanent part of the record drawings.
  - 5. Reviewed shop drawings, product data, and samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
  - 7. Requests for Information (RFI)
    - a. RFI's shall be made a permanent part of the record drawings.
  - 8. Architect's Supplementary Instructions (ASI)

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- a. ASI's shall be made a permanent part of the record drawings.
- 9. Approved Construction Change Directives (CCD)
  - a. Approved CCD's shall be made a permanent part of the record drawings.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
  - 1. Record drawings shall be reviewed by Architect, Inspector, and Owner at the time of Application for Payment. If Record drawings are deemed incomplete, delays in payment may occur.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured depths of foundations in relation to finish first floor datum.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 4. Field changes of dimension and detail.
  - 5. Details not on original Contract drawings.

### **3.02 OPERATION AND MAINTENANCE DATA**

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

### **3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES**

- A. For Each Product, Applied Material, and Finish:
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

### **3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS**

- A. For Each Item of Equipment and Each System:
  - 1. Description of unit or system, and component parts.
  - 2. Identify function, normal operating characteristics, and limiting conditions.
  - 3. Include performance curves, with engineering data and tests.
  - 4. Complete nomenclature and model number of replaceable parts.

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- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- E. Provide servicing and lubrication schedule, and list of lubricants required.
- F. Include manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.
- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Additional Requirements: As specified in individual product specification sections.

### **3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS**

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- J. Arrangement of Contents: Organize each volume in parts as follows:
  - 1. Project Directory.
  - 2. Table of Contents, of all volumes, and of this volume.
  - 3. Operation and Maintenance Data: Arranged by system, then by product category.
    - a. Source data.
    - b. Product data, shop drawings, and other submittals.
    - c. Operation and maintenance data.
    - d. Field quality control data.
    - e. Photocopies of warranties and bonds.

### 3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 by 11 inch (216 by 279 mm) three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

**SECTION 01 7900  
DEMONSTRATION AND TRAINING**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
  - 1. All software-operated systems.
  - 2. HVAC systems and equipment.
  - 3. Plumbing equipment.
  - 4. Electrical systems and equipment.
  - 5. Conveying systems.
  - 6. Landscape irrigation.
  - 7. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
  - 1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
  - 2. Finishes, including flooring, wall finishes, ceiling finishes.
  - 3. Fixtures and fittings.
  - 4. Items specified in individual product Sections.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 7800 - Closeout Submittals: Operation and maintenance manuals.
- B. Section 01 9113 - General Commissioning Requirements: Additional requirements applicable to demonstration and training.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
  - 1. Submit not less than two weeks prior to start of training.
  - 2. Revise and resubmit until acceptable.
  - 3. Provide an overall schedule showing all training sessions.
  - 4. Include at least the following for each training session:
    - a. Identification, date, time, and duration.
    - b. Description of products and/or systems to be covered.
    - c. Name of firm and person conducting training; include qualifications.
    - d. Intended audience, such as job description.
    - e. Objectives of training and suggested methods of ensuring adequate training.
    - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
    - g. Media to be used, such as slides, hand-outs, etc.
    - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
  - 1. Include applicable portion of O&M manuals.
  - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
  - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
  - 1. Format: Per Owner's Request

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2. Label each disc and container with session identification and date.

#### **1.04 QUALITY ASSURANCE**

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
  1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
  2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

#### **PART 2 PRODUCTS - NOT USED**

#### **PART 3 EXECUTION**

##### **3.01 DEMONSTRATION - GENERAL**

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstration may be combined with Owner personnel training if applicable.
- C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
- D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.

##### **3.02 TRAINING - GENERAL**

- A. Conduct training on-site unless otherwise indicated.
- B. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- C. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
  1. The location of the O&M manuals and procedures for use and preservation; backup copies.
  2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
  3. Typical uses of the O&M manuals.
- D. Product- and System-Specific Training:
  1. Review the applicable O&M manuals.
  2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
  3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
  4. Provide hands-on training on all operational modes possible and preventive maintenance.
  5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
  6. Discuss common troubleshooting problems and solutions.
  7. Discuss any peculiarities of equipment installation or operation.
  8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
  9. Review recommended tools and spare parts inventory suggestions of manufacturers.
  10. Review spare parts and tools required to be furnished by Contractor.
  11. Review spare parts suppliers and sources and procurement procedures.

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- E. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

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## SECTION 07 9200 JOINT SEALANTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

#### 1.02 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014a.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- D. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015.
- E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

#### 1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
  - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
  - 2. List of backing materials approved for use with the specific product.
  - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
  - 4. Substrates the product should not be used on.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

#### 1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

### PART 2 PRODUCTS

#### 2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
  - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
    - a. Wall expansion and control joints.
    - b. Joints between door, window, and other frames and adjacent construction.
    - c. Joints between different exposed materials.
  - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.

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- a. Joints between door, window, and other frames and adjacent construction.
- 3. Do not seal the following types of joints.
  - a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
  - b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
  - c. Joints where installation of sealant is specified in another section.
  - d. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
- C. Interior Joints: Use nonsag Acrylic emulsion latex sealant, unless otherwise indicated.
  - 1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.

## **2.02 JOINT SEALANTS - GENERAL**

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in South Coast Air Quality Management District (SCAQMD); Rule 1168.

## **2.03 NONSAG JOINT SEALANTS**

- A. Type 1 - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus 25 percent, minimum.
- B. Type 2 - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
  - 1. Color: Standard colors matching finished surfaces, Type OP (opaque).

## **2.04 SELF-LEVELING SEALANTS**

- A. Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; Intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
  - 1. Hardness: 75, Shore A, minimum, when tested in accordance with ASTM D2240 after 7 days.
  - 2. Color: Concrete gray.

## **2.05 ACCESSORIES**

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- D. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

### **3.02 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

### **3.03 INSTALLATION**

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- H. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

### **3.04 FIELD QUALITY CONTROL**

- A. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

**SECTION 08 3100  
ACCESS DOORS AND PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wall access door and frame units.
- B. Ceiling access door and frame units.

**1.02 REFERENCE STANDARDS**

- A. ITS (DIR) - Directory of Listed Products; current edition.
- B. UL (FRD) - Fire Resistance Directory; current edition.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of each access door and/or panel unit.

**PART 2 PRODUCTS**

**2.01 ACCESS DOOR AND PANEL APPLICATIONS**

- A. Walls, Unless Otherwise Indicated:
  - 1. Material: Steel.
  - 2. Size: 12 by 12 inch (305 by 305 mm), unless otherwise indicated or required by function.
  - 3. Standard duty, hinged door.
  - 4. Tool-operated spring or cam lock; no handle.
  - 5. In Gypsum Board: Drywall bead frame with door surface flush with wall surface.
  - 6. In Plaster: Drywall bead frame with door surface flush with wall surface.
  - 7. In Masonry: Surface mounted frame with door surface flush with frame surface.
- B. Walls in Wet Areas:
  - 1. Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
  - 2. Size: 12 by 12 inch (305 by 305 mm), unless otherwise indicated or required by function.
  - 3. Standard duty, hinged door.
  - 4. Tool-operated spring or cam lock; no handle.
- C. Fire Rated Walls: See drawings for wall fire ratings.
  - 1. Material: Steel.
  - 2. Size: 12 by 12 inch (305 by 305 mm), unless otherwise indicated or required by function.
  - 3. Uninsulated, single thickness door panel.
  - 4. Tool-operated spring or cam lock; no handle.
- D. Ceilings, Unless Otherwise Indicated: Same type as for walls.

**2.02 WALL AND CEILING UNITS**

- A. Access Doors: Factory fabricated door and frame units, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies that units are to be installed in.
  - 1. Material: Steel.
  - 2. Frames and flanges: 0.058 inch (1.5 mm) steel.
  - 3. Door panels: 0.070 inch (1.8 mm) single thickness steel sheet.
  - 4. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly that access doors are being installed.
    - a. Provide products listed by ITS (DIR), UL (FRD), ITS (DIR), or UL (FRD) as suitable for the purpose indicated.
  - 5. Steel Finish: Primed.

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6. Hardware:
  - a. Hinge: Non-Fire-Rated Units: 175 degree steel hinges with removable pin.
  - b. Hinge: Concealed constant force closure spring type.
  - c. Latch/Lock: Screw driver slot for quarter turn cam latch.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that rough openings are correctly sized and located.

#### **3.02 INSTALLATION**

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position units to provide convenient access to the concealed work requiring access.

**SECTION 09 2116  
GYPSUM BOARD ASSEMBLIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Gypsum wallboard.
- D. Joint treatment and accessories.
- E. Textured finish system.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Building framing and sheathing.
- B. Section 07 2100 - Thermal Insulation: Acoustic insulation.

**1.03 REFERENCE STANDARDS**

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- B. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- C. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- E. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- F. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- G. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- H. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014a.
- I. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- J. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- K. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- L. GA-216 - Application and Finishing of Gypsum Board; 2013.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.

**PART 2 PRODUCTS**

**2.01 GYPSUM BOARD ASSEMBLIES**

- A. Provide completed assemblies complying with ASTM C840 and GA-216.

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- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
  - 1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
  - 1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft (0.24 kPa) with maximum mid-span deflection of L/240.
  - 2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- D. Fire-Resistance-Rated Assemblies: Provide completed assemblies per the drawings.

## 2.02 METAL FRAMING MATERIALS

- A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf (L/240 at 240 Pa).
  - 1. Studs: "C" shaped with flat or formed webs with knurled faces.
  - 2. Runners: U shaped, sized to match studs.
- B. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.

## 2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
  - 1. Georgia-Pacific Gypsum; \_\_\_\_: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
  - 2. National Gypsum Company; \_\_\_\_: [www.nationalgypsum.com/#sle](http://www.nationalgypsum.com/#sle).
  - 3. USG Corporation; \_\_\_\_: [www.usg.com/#sle](http://www.usg.com/#sle).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
  - 1. Application: Use for vertical surfaces, unless otherwise indicated.
  - 2. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
  - 3. Thickness:
    - a. Vertical Surfaces: 5/8 inch (16 mm).
    - b. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
- C. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
  - 1. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  - 2. Regular Board Thickness: 5/8 inch (16 mm).
  - 3. Edges: Tapered.
- D. Shaftwall Construction: Refer to drawings for requirements of shaft and elevator wall construction.

## 2.04 ACCESSORIES

- A. Acoustic Insulation: As specified in Section 07 2100.
- B. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
  - 1. Types: As detailed or required for finished appearance.
  - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
- C. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
  - 1. Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners.
  - 2. Ready-mixed vinyl-based joint compound.

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- D. Textured Finish Materials: Latex-based compound; plain.
- E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch (0.84 to 2.84 mm) in Thickness: ASTM C954; steel drill screws, corrosion resistant.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

### **3.02 SHAFT WALL INSTALLATION**

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
  - 1. Install studs at spacing required to meet performance requirements.
- B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.

### **3.03 FRAMING INSTALLATION**

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Studs: Space studs at 16 inches on center (at 406 mm on center).
  - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
  - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling framing in accordance with details.
  - 3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
- C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

### **3.04 ACOUSTIC ACCESSORIES INSTALLATION**

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

### **3.05 BOARD INSTALLATION**

- A. Comply with ASTM C 840, GA-216, ASTM C 840, GA-216, ASTM C 840, and GA-216. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board with sealant.

### **3.06 INSTALLATION OF TRIM AND ACCESSORIES**

- A. Corner Beads: Install at external corners, using longest practical lengths.
- B. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

### **3.07 JOINT TREATMENT**

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:

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1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
  2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
  3. Level 3: Walls to receive textured wall finish.
  4. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
  5. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).
- D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

### **3.08 TEXTURE FINISH**

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.

### **3.09 TOLERANCES**

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

**SECTION 09 9000  
PAINTS AND COATINGS - EXTERIOR**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Exterior paints and coatings.
- B. Surface preparation.
- C. Field application of paints and other coatings.

**1.02 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on all finishing products, including VOC content..
- C. Samples: Submit two samples, 8-1/2" x 11" inch (\_\_\_\_x\_\_\_\_ mm) in size, illustrating selected colors and textures for each color and system selected. Submit on cardstock..
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces..

**1.03 QUALITY ASSURANCE**

- A. Applicator Qualifications: Applicator specializing in performing the work of this section must have minimum three years experience.

**1.04 PROTECTION AND SAFEGUARD**

- A. The contractor shall provide continuous dust, over-spray and fumes control to protect adjacent areas. Any use of noisy or hazardous equipment shall be coordinated with the District Representative.
- B. Any accidental spillage, etc.; on any surface shall be immediately cleaned and the damaged surfaces restored to their original condition.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, product name, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in an adequately protected well ventilated area, and as required by manufacturer's instructions.
- D. Storage containers: Subject to District Representative approval as to the type, and placement at the site.
  - 1. All painting materials (including rags, tarpaulins, mixers, empty containers, and filled or partially filled containers) shall be kept in designated storage areas. All material mixing and handling shall be performed in designated area.

**1.06 CLEANING OF PREMISES**

- A. Whenever painting and finishing work is being performed; all walks, steps, floors, plants, unpainted surfaces and adjacent areas shall be carefully protected from damage by the preparation and painting work. Contractors to provide clean drop cloths and used wherever necessary. All supply materials, paints, containers, etc.; shall be orderly and carefully arranged and protected.
- B. During the process of the work, the contractor shall carefully clean up after his crew and shall leave the area in which his employees are working free from debris.

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- C. Upon completion of the painting contract, remove all materials and equipment, unusable scraps, waste and debris, leaving the areas in a clean, orderly and acceptable condition. School district trash containers shall not be used for waste of any kind.
- D. Collect waste material, which may constitute a fire hazard, place in closed metal containers, and removed daily from site.

#### **1.07 SPECIAL REQUIREMENTS**

- A. The contractor shall inspect the facilities to be painted carefully to check and verify all dimensions, sizes, etc.; including conditions at the site and shall assume full responsibility for all errors and unexpected conditions, which arise through lack of verification.

#### **1.08 EXTRA MATERIALS**

- A. Supply 1-gallon of each color, store where directed.
- B. Label each container with color in addition to the manufacturer's label.

### **PART 2 PRODUCTS**

#### **2.01 EXTERIOR PAINT**

- A. Contractor shall provide Paint meeting the following specifications exactly.

#### **2.02 PAINTS AND COATINGS – GENERAL**

- A. Material to be factory mixed and factory tinted, except field catalyzed coatings. Field tinting of materials will not be permitted.
- B. Paint accessory and sundry materials such as: putty, spackle, thinners, reducers, and caulking shall be of the highest quality and fully compatible with substrate and subsequent finishes.

#### **2.03 PAINT SYSTEMS- EXTERIOR**

- A. CONCRETE - PLASTER - STUCCO
  - 1. Finish: Eggshell
    - a. Coating Type: 100% Acrylic
    - b. Finishing Schedule:
      - 1) 1st coat Vista # 4600 Uniprime II or 4000 Uniprime
      - 2) 2nd coat Vista #8300 Carefree Eggshell
      - 3) 3rd coat Vista #8300 Carefree Eggshell
- B. MASONRY - BLOCK - BRICK
  - 1. Finish: Eggshell
    - a. Coating Type: 100% Acrylic
    - b. Finishing Schedule: 1st coat Vista#040 Block Kote
      - 1) 1st coat Vista#040 Block Kote
      - 2) 2nd coat Vista#8300 Carefree Eggshell
      - 3) 3rd coat Vista#8300 Carefree Eggshell
- C. WOOD: Rough Sawn Facia
  - 1. Finish: Flat
    - a. Coating Type: 100% Acrylic
    - b. Finish Schedule:
      - 1) 1st coat Vista#4200 Terminator II
      - 2) 2nd coat Vista #3000 Acribond
      - 3) 3rd coat Vista #3000 Acribond
- D. WOOD: a. Sidings
  - 1. Finish: Eggshell
    - a. Coating Type: 100% Acrylic
    - b. Finish Schedule: 1st coat Vista#4200 Terminator II
      - 1) 2nd coat Vista #8300 Carefree
      - 2) 3rd coat Vista #8300 Carefree

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2. b. Smooth Doors
  - a. Finish: Gloss
  - b. Coating Type: 100% Acrylic
  - c. Finish Schedule:
    - 1) 1st coat Vista#4000 Uniprime
    - 2) 2nd coat Vista #9900 Gloss Protec Alkyd Emulsion
    - 3) 3rd coat Vista #9900 Gloss Protec Alkyd Emulsion
- E. METAL: Ferrous - Iron - Steel Doors
  1. Finish: Gloss
    - a. Coating Type: 100% Acrylic
    - b. Finishing Schedule:
      - 1) 1st coat Vista#9600 Protec Metal Prime
      - 2) 2nd coat Vista#9900 Gloss Protec Alkyd Emulsion
      - 3) 3rd coat Vista #9900 Gloss Protec Alkyd Emulsion
- F. METAL: Non Ferrous - Galvanized - Aluminum
  1. Finish: Gloss
    - a. Coating Type: 100% Acrylic
    - b. Finishing Schedule:
      - 1) Krud Kutter Metal Etch and Clean
      - 2) 1st coat Vista 4800 Metal Pro
      - 3) 2nd coat Vista #9900 Gloss Protec Alkyd Emulsion
      - 4) 3rd coat Vista #9900 Gloss Protec Alkyd Emulsion

## 2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Paint thinner and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.
- B. Patching Material: Exterior spackle paste.
- C. Caulking Material: Latex painter's caulk (No silicone).

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that surfaces are ready to receive paint as recommended by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Prepare surfaces that may potentially affect proper application.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishers unless moisture content of surfaces are below the following maximums:
  1. Plaster and Gypsum Wallboard: 12 percent.
  2. Masonry, Concrete, and Concrete Unit masonry: 12 percent.
  3. Exterior wood: 15 percent, measured in accordance with ASTM D4442.

### 3.02 PREPARATION

- A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fitting prior to preparing surfaces or finishing.
- B. Surfaces: Correct defects and clean surfaces, which affect work of this section. Remove or repair existing coating that exhibit surface defects.
- C. Marks: Seal marks with shellac, those bleeding through surface finish.
- D. Impervious Surfaces: Any surface displaying sign of mold, fungus, mildew or any other rot to be cleansed free of the offending agent by bleaching and the application of the appropriate fungicide, and mildewcide. Rinse with clean water and allow surface to dry.
- E. Concrete and Unit Masonry Surfaces: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign mater. Remove oil and grease with a solution or tri-sodium phosphate; rinse

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well and allow to dry. Remove stains caused by weathering or corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

- F. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- G. Aluminum Surfaces: Remove surface contamination by approved method. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- H. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Wash surface with acid etching and apply coat of etching primer.
- I. Ferrous Metals: Wash with solvent. Acid etch with phosphoric acid.
- J. Wood Doors: Prime wood door top and bottom edge surfaces.
- K. Metal Doors: Prime metal door top and bottom edge surfaces.
- L. Unless specifically excluded, all surfaces are to be sanded until smooth and cleaned thoroughly. All glossy surfaces are to be de-glossed either by sanding or by the use of a previously district approved de-glossing agent. Use of any de-glossing agent to be used in strict accordance with manufacturer's instructions.
- M. All holes, cracks, joints, abutments, nail heads, pits, depressions, voids, and imperfections to be filled until surface is flush after drying. Fillers to be of the highest quality and appropriate for the conditions to ensure permanency to the surface and compatible to the systems to follow. "Float off" and "texture" the repair material to match adjacent areas. Prime areas first with appropriate primers and then again after being allowed to cure.
- N. All surfaces and substrates to be inspected and deemed as substantial. When surfaces do not have integrity the proper remedial actions are to be taken before any further actions are taken.
- O. All surface are to be tested to tested to insure that any remaining paint is substantial and will not lift, peel separate, bubble, alligator, etc.; and are compatible with subsequent coatings. If the existing paint fails any of these tests then existing paint is to be removed and the surfaces inspected and approved by the district prior to any further coating being applied.
- P. Upon completion of each step of the panting process (i.e., after each washing, prepping, filling, priming and painting) the work is to be inspected and approved by the district prior to the next step being taken. Re- work surfaces not approved until they are acceptable and approved by the district representative.

### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- C. Apply primers, undercoats, and finishes free from sags, runs, skips, and other defects. Primers and undercoats will not be allowed to be of the same color as the finish coats.
- D. Allow each coat to thoroughly dry before application of succeeding coats in accordance with manufacturer's recommendations and have each coat inspected and approved by the district representative before applying succeeding coats.
- E. Backrolling of all wood siding to be performed. Stucco to be backrolled when deemed necessary by the district representative. The intent is to insure uniform coverage and sheen.
- F. All exposed surfaces to be primed immediately and not allowed to be left unprotected.
- G. Paint all soffits and overhangs body colors, not trim or accent color.

### **3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT**

- A. Remove unfinished louvers, grilles, and covers and access panels on mechanical and electrical components and paint separately.
- B. Finish equipment, piping, conduit, and exposed ductwork in utility areas in colors according to the color schedule.

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- C. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, etc., and fittings removed prior to finishing.

### **3.05 SCHEDULE – SURFACES TO BE FINISHED**

- A. Do not paint or finish the following items:
  - 1. Items fully factory-finished unless specifically noted.
  - 2. Fire rating labels, equipment serial number and capacity labels.
  - 3. Stainless steel items.

### **3.06 CLOSEOUT ACTIVITIES**

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

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**SECTION 09 9100  
PAINTS AND COATINGS - INTERIOR**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Interior paints and coatings.
- B. Surface preparation.
- C. Field application of paints and other coatings.

**1.02 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on all finishing products, including VOC content.
- C. Samples: Submit two painted samples, 8-1/2" x 11" inch (\_\_\_\_x\_\_\_\_ mm) in size, illustrating selected colors and textures for each color and system selected. Submit on cardstock..
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces..

**1.03 QUALITY ASSURANCE**

- A. Applicator Qualifications: Applicator specializing in performing the work of this section must have minimum three years experience.

**1.04 PROTECTION AND SAFEGUARD**

- A. The contractor shall provide continuous dust, over-spray and fumes control to protect adjacent areas. Any use of noisy or hazardous equipment shall be coordinated with the District Representative.
- B. Any accidental spillage, etc.; on any surface shall be immediately cleaned and the damaged surfaces restored to their original condition.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, product name, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in an adequately protected well ventilated area, and as required by manufacturer's instructions.
- D. Storage containers: Subject to District Representative approval as to the type, and placement at the site.
  - 1. All painting materials (including rags, tarpaulins, mixers, empty containers, and filled or partially filled containers) shall be kept in designated storage areas. All material mixing and handling shall be performed in designated area.

**1.06 ENVIRONMENTAL REQUIREMENTS**

- A. Do not apply material when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Do not apply exterior coatings during rain or when relative humidity outside the humidity ranges required by the paint product manufacturer.
- C. All work, equipment and material to conform to federal, state and local laws and regulations, including but not limited to Air Pollution Control District, Hazardous material, Cal- OSHA, and wastewater division and fire regulations. MSDS's for all materials on site must be kept at the work site readily available for inspection.

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### **1.07 CLEANING OF PREMISES**

- A. Whenever painting and finishing work is being performed; all walks, steps, floors, plants, unpainted surfaces and adjacent areas shall be carefully protected from damage by the preparation and painting work. Contractors to provide clean drop cloths and used wherever necessary. All supply materials, paints, containers, etc.; shall be orderly and carefully arranged and protected.
- B. During the process of the work, the contractor shall carefully clean up after his crew and shall leave the area in which his employees are working free from debris.
- C. Upon completion of the painting contract, remove all materials and equipment, unusable scraps, waste and debris, leaving the areas in a clean, orderly and acceptable condition. School district trash containers shall not be used for waste of any kind.
- D. Collect waste material, which may constitute a fire hazard, place in closed metal containers, and removed daily from site.

### **1.08 SPECIAL REQUIREMENTS**

- A. The contractor shall inspect the facilities to be painted carefully to check and verify all dimensions, sizes, etc.; including conditions at the site and shall assume full responsibility for all errors and unexpected conditions, which arise through lack of verification.
- B. Prohibition of alcohol, illegal substance, weapons, and tobacco products on School District property will be strictly enforced.
- C. All contractors' employees and representatives shall conduct themselves in a professional manner at all times while on school district property. Any contractor employee practicing inappropriate behavior including but not limited to: vulgar language, inappropriate dress, loud music, etc. will be restricted from working on Vista Unified School District property.

### **1.09 EXTRA MATERIAL**

- A. Supply 1-gallon of each color, store where directed.
- B. Label each container with color in addition to manufacturer's label.

## **PART 2 PRODUCTS**

### **2.01 INTERIOR PAINT**

- A. Contractor shall provide Paint meeting the following specifications exactly.

### **2.02 PAINTS AND COATINGS – GENERAL**

- A. Material to be factory mixed and factory tinted, except field catalyzed coatings. Field tinting of materials will not be permitted.
- B. Paint accessory and sundry materials such as: putty, spackle, thinners, reducers, and caulking shall be of the highest quality and fully compatible with substrate and subsequent finishes.

### **2.03 PAINT SYSTEMS- INTERIOR**

- A. Steel Doors/Door and Window Frames
  - 1. Finish: Gloss
  - 2. Coating Type: 100% Acrylic
  - 3. Finishing Schedule:
    - a. 1st coat Vista # 9600 Metal Prime
    - b. 2nd coat Vista #9900 Gloss Protec Alkyd Emulsion
    - c. 3rd coat Vista #9900 Gloss Protec Alkyd Emulsion
- B. Wood Doors/Door and Window Frames
  - 1. Finish: Gloss
  - 2. Coating Type: 100% Acrylic
  - 3. Finishing Schedule: 1st coat Vista#4200 Terminator II
    - a. 2nd coat Vista#9900 Gloss Protec Alkyd Emulsion

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- b. 3rd coat Vista#9900 Protec Alkyd Emulsion
- C. Gypsum Walls
  - 1. Finish: Eggshell
  - 2. Coating Type: 100% Acrylic
  - 3. Finish Schedule: 1st coat Vista#1100 High Build PVA
    - a. 2nd coat Vista #8300 Carefree
    - b. 3rd coat Vista #8300 Carefree
- D. Acoustic Tile Ceilings
  - 1. Finish: Flat
  - 2. Coating Type: Vinyl flat
  - 3. Finish Schedule: 1st coat Vista Paint Sealer
    - a. 2nd coat Acoustic-Kote #013
- E. METAL: Ferrous - Iron - Steel Doors
  - 1. Finish: Gloss
  - 2. Coating Type: Alkyd
  - 3. Finishing Schedule: 1st coat Vista Paint 9600 Protect Metal Prime
    - a. 2nd coat Vista #9900 Gloss Protec Alkyd Emulsion
    - b. 3rd coat Vista #9900 Gloss Protec Alkyd Emulsion
- F. METAL: Non Ferrous - Galvanized - Aluminum
  - 1. Finish: Gloss
  - 2. Coating Type: Alkyd
  - 3. Finishing Schedule: 1st coat Krud Kutter Metal Etch
    - a. 2nd coat Vista #4800 Metal Pro
    - b. 3rd coat Vista #9900 Gloss Protec Alkyd Emulsion
    - c. 4th coat Vista#9900 Gloss Protec Alkyd Emulsion
- G. All Other Wall Surfaces
  - 1. Finish: Eggshell
  - 2. Coating Type: 100% Acrylic
  - 3. Finishing Schedule: 1st coat Vista #4000 Uniprime
    - a. 2nd coat Vista #8300 Carefree
    - b. 3rd coat Vista #8300 Carefree

## 2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Paint thinner and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.
- B. Patching Material: Exterior spackle paste.
- C. Caulking Material: Latex painter's caulk (No silicone).

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that surfaces are ready to receive paint as recommended by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Prepare surfaces that may potentially affect proper application.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishers unless moisture content of surfaces are below the following maximums:
  - 1. Plaster and Gypsum Wallboard: 12 percent.
  - 2. Masonry, Concrete, and Concrete Unit masonry: 12 percent.
  - 3. Exterior wood: 15 percent, measured in accordance with ASTM D4442.

### 3.02 PREPARATION

- A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fitting prior to preparing surfaces or finishing.
- B. Surfaces: Correct defects and clean surfaces, which affect work of this section. Remove or repair existing coating that exhibit surface defects.
- C. Marks: Seal marks with shellac, those bleeding through surface finish.
- D. Impervious Surfaces: Any surface displaying sign of mold, fungus, mildew or any other rot to be cleansed free of the offending agent by bleaching and the application of the appropriate fungicide, and mildewcide. Rinse with clean water and allow surface to dry.
- E. Concrete and Unit Masonry Surfaces: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign mater. Remove oil and grease with a solution or tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering or corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- F. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- G. Aluminum Surfaces: Remove surface contamination by approved method. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- H. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Wash surface with acid etching and apply coat of etching primer.
- I. Ferrous Metals: Wash with solvent. Acid etch with phosphoric acid.
- J. Wood Doors: Prime wood door top and bottom edge surfaces.
- K. Metal Doors: Prime metal door top and bottom edge surfaces.
- L. Unless specifically excluded, all surfaces are to be sanded until smooth and cleaned thoroughly. All glossy surfaces are to be de-glossed either by sanding or by the use of a previously district approved de-glossing agent. Use of any de-glossing agent to be used in strict accordance with manufacturer's instructions.
- M. All holes, cracks, joints, abutments, nail heads, pits, depressions, voids, and imperfections to be filled until surface is flush after drying. Fillers to be of the highest quality and appropriate for the conditions to ensure permanency to the surface and compatible to the systems to follow. "Float off" and "texture" the repair material to match adjacent areas. Prime areas first with appropriate primers and then again after being allowed to cure.
- N. All surfaces and substrates to be inspected and deemed as substantial. When surfaces do not have integrity the proper remedial actions are to be taken before any further actions are taken.
- O. All surface are to be tested to tested to insure that any remaining paint is substantial and will not lift, peel separate, bubble, alligator, etc.; and are compatible with subsequent coatings. If the existing paint fails any of these tests then existing paint is to be removed and the surfaces inspected and approved by the district prior to any further coating being applied.
- P. Upon completion of each step of the panting process (i.e., after each washing, prepping, filling, priming and painting) the work is to be inspected and approved by the district prior to the next step being taken. Re- work surfaces not approved until they are acceptable and approved by the district representative.

### 3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- C. Apply primers, undercoats, and finishes free from sags, runs, skips, and other defects. Primers and undercoats will not be allowed to be of the same color as the finish coats.
- D. Allow each coat to thoroughly dry before application of succeeding coats in accordance with manufacturer's recommendations and have each coat inspected and approved by the district

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representative before applying succeeding coats.

- E. Backrolling of all woodsiding to be performed. Stucco to be backrolled when deemed necessary by the district representative. The intent is to insure uniform coverage and sheen.
- F. All exposed surfaces to be primed immediately and not allowed to be left unprotected.
- G. Paint all soffits and overhangs body colors, not trim or accent color.

#### **3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT**

- A. Remove unfinished louvers, grilles, and covers and access panels on mechanical and electrical components and paint separately.
- B. Finish equipment, piping, conduit, and exposed ductwork in utility areas in colors according to the color schedule.
- C. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, etc., and fittings removed prior to finishing.

#### **3.05 SCHEDULE – SURFACES TO BE FINISHED**

- A. Do not Paint or Finish the following Items:
  - 1. Items fully factory-finished unless specifically noted.
  - 2. Fire rating labels, equipment serial number and capacity labels.
  - 3. Stainless steel items.

#### **3.06 CLOSEOUT ACTIVITIES**

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

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**SECTION 26 0100**  
**ELECTRICAL GENERAL PROVISIONS**

**ARTICLE 1      SUMMARY**

- 1.1      This Division of the specification outlines the provisions of the contract work to be performed under this Division.
- 1.2      This Section applies to and forms a part of each section of specifications in Division 26.
- 1.3      In addition, work in this Division is governed by the provisions of the bidding requirements, contract forms, general conditions and all sections under general requirements.
- 1.4      These specifications contain statements which may be more definitive or more restrictive than those contained in the General Conditions. Where these statements occur, they shall take precedence over the General Conditions.
- 1.5      Where the words 'provide' or 'provision' are used, it shall be definitely interpreted as 'furnishing and installing complete in operating condition'. Where the words 'as indicated' or 'as shown' are used, it shall mean as shown on contract drawings.
- 1.6      Where items are specified in the singular, this Division shall provide the quantity as shown on drawings plus any spares or extras mentioned on drawings or specifications. All specified and supplied equipment shall be new.

**ARTICLE 2      CONTRACTOR QUALIFICATIONS**

- 2.1      The Contractor shall have a current California C-10 Electrical Contractor's license and all individuals working on this project shall have passed the Department of Industrial Relations Division of apprenticeship Standards – "Electrician Certification Program."

**ARTICLE 3      CODES, PERMITS AND FEES**

- 3.1      Comply with all applicable laws, ordinances, rules, regulations, codes, or rulings of governmental units having jurisdiction as well as standards of NFPA and serving utility requirements.
- 3.2      Obtain permits, fees, inspections, meter and the like, associated with work in each section of this Division.
- 3.3      Installation procedures, methods and conditions shall comply with the latest requirements of the Federal Occupational Safety and Health Act (OSHA).

**ARTICLE 4      EXAMINATION OF PREMISES**

- 4.1      Examine the construction drawings and premises prior to bidding. No allowances will be made for not being knowledgeable of existing conditions.

**ARTICLE 5      STANDARDS**

- 5.1 The following standard publications of the latest editions enforced, and supplements thereto shall form a part of these specifications. All electrical work must, as a minimum, be in accordance with these standards.

- 5.1.1 2022 California Electrical Code (CEC), Part 3 Title 24 CCR.
- 5.1.2 National Fire Protection Association.
- 5.1.3 Underwriters' Laboratories, Inc. (UL).
- 5.1.4 Certified Ballast Manufacturers' Association (CBM).
- 5.1.5 National Electrical Manufacturers' Association (NEMA).
- 5.1.6 Institution of Electrical & Electronics Engineers (IEEE).
- 5.1.7 American Society for Testing & Materials (ASTM).
- 5.1.8 National Board of Fire Underwriters (NBFU).
- 5.1.9 National Board of Standards (NBS).
- 5.1.10 American National Standards Institute (ANSI).
- 5.1.11 Insulated Power Cable Engineers Association (IPECS).
- 5.1.12 Electrical Testing Laboratories (ETL).
- 5.1.13 National Electrical Safety Code (NESC).
- 5.1.14 2022 California Building Code (CBC), Part 2, Title 24 CCR.
- 5.1.15 2022 California Fire Code (CFC), Part 9, Title 24, CCR.
- 5.1.16 2022 NFPA 72 with California State Amendments
- 5.1.17 National Electrical Testing Association (NETA), 2010 or most current

## **ARTICLE 6 DEFINITIONS**

- 6.1 Concealed: Hidden from sight, as in trenches, chases, hollow construction, or above furred spaces, hung ceilings - acoustical or plastic type, or exposed to view only in tunnels, attics, shafts, crawl spaces, unfinished spaces, or other areas solely for maintenance and repair.
- 6.2 Exposed, Non-Concealed, Unfinished Space: A room or space that is ordinarily accessible only to building maintenance personnel, a room noted on the 'finish schedule' with exposed and unpainted construction for walls, floors, or ceilings or specifically mentioned as 'unfinished'.
- 6.3 Finish Space: Any space ordinarily visible, including exterior areas.

## **ARTICLE 7 WORK AND MATERIALS**

- 7.1 Unless otherwise specified, all materials must be new and of the best quality. Materials previously incorporated into other projects, salvaged, or refurbished are not considered new. Perform all labor in a thorough and workmanlike manner.
- 7.2 All materials provided under the contract must bear the UL label where normally available. Note that this requirement may be repeated under equipment specifications. In general, such devices as will void the label should be provided in separate enclosures and wired to the labeled unit in proper manner.

## **ARTICLE 8 SHOP DRAWINGS AND SUBMITTALS**

- 8.1 Submit shop drawings and all data in accordance with Division 1 of these specifications and as noted below for all equipment provided under this Division.
- 8.2 Shop drawings submittals demonstrate to the Architect that the Contractor understands the design concept. The Contractor demonstrates their understanding by indicating

which equipment and material they intend to furnish and install and by detailing the fabrication and installation methods of material and equipment he intends to use. If deviations, discrepancies, or conflicts between submittals and specifications are discovered either prior to or after submittals are processed, notify the Architect immediately.

- 8.3 Manufacturer's data and dimension sheets shall be submitted giving all pertinent physical and engineering data including weights, cross sections and maintenance instructions. Standard items of equipment such as receptacles, switches, plates, etc., which are cataloged items, shall be listed by manufacturer.
- 8.4 Index all submittals and reference them to these specifications. All submittal items shall be assembled and submitted, one for each specification section. (Multiple specification sections may be grouped together in one common submittal binder, as long as each individual section is clearly identified.) Partial or incomplete submittal sections will not be reviewed.

#### **ARTICLE 9 EQUIPMENT PURCHASES**

- 9.1 Arrange for purchase and delivery of all materials and equipment within 20 days after approval of submittals. All materials and equipment must be ordered in ample quantities for delivery at the proper time. If items are not on the project in time to expedite completion, the Owner may purchase said equipment and materials and deduct the cost from the contract sum.
- 9.2 Provide all materials of similar class or service by one manufacturer.

#### **ARTICLE 10 COOPERATIVE WORK**

- 10.1 Correct without charge any work requiring alteration due to lack of proper supervision or failure to make proper provision in time. Correct without charge any damage to adjacent work caused by the alteration.
- 10.2 Cooperative work includes: General supervision and responsibility for proper location and size of work related to this Division, but provided under the other sections of these specifications, and installation of sleeves, inserts, and anchor bolts for work under each section in this Division.

#### **ARTICLE 11 VERIFICATION OF DIMENSIONS**

- 11.1 Scaled and figured dimensions are approximate only. Before proceeding with work, carefully check and verify dimensions, etc., and be responsible for properly fitting equipment and materials together and to the structure in spaces provided.
- 11.2 Drawings are essentially diagrammatic, and many offsets, bends, pull boxes, special fittings, and exact locations are not indicated. Carefully study drawings and premises in order to determine best methods, exact location, routes, building obstructions, etc. and install apparatus and equipment in manner and locations to avoid obstructions, preserve headroom, keep openings and passageways clear, and maintain proper clearances.

#### **ARTICLE 12 CLOSING-IN OF UNINSPECTED WORK**

- 12.1 Cover no work until inspected, tested, and approved by the Architect. Where work is covered before inspection and test, uncover it and when inspected, tested, and approved, restore all work to original proper condition at no additional cost to Owner.

#### **ARTICLE 13 EXCAVATION AND BACKFILL**

- 13.1 All excavation and backfill shall be in accordance with Division 1 of these specifications and as noted below.
- 13.2 Perform all necessary excavation, shoring, and backfilling required for the proper laying of all conduits inside the building and premises, and outside as may be necessary.
- 13.3 Excavate all trenches open cut, keep trench banks as nearly vertical as practicable, and sheet and brace trenches where required for stability and safety. Excavate trenches true to line and make bottoms no wider than necessary to provide ample work room. Grade trench bottoms accurately. Machine grade only to the top line of the conduits, doing the remainder by hand. Do not cut any trench near or under footings without first consulting the Architect. All trenches shall be done in accordance with OSHA standards and regulations.
- 13.4 Backfilling shall be done with each layer compacted before another layer is added. No stones or coarse lumps shall be laid directly on a conduit or conduits.
- 13.5 Trenches shall be filled with the specified material. Sod, if any, shall be removed in cut sections and replaced in same manners.
- 13.6 Provide pumps and drainage of all open trenches for purposes of installing electrical duct and wiring.
- 13.7 Perform all backfilling in accordance with the requirements of and under the direction of the Geotechnical Engineer.
- 13.8 Where new underground trenching is required on sites or in any area where existing underground utilities exist, the Contractor shall provide an independent professional utility locating service to locate exact vertical and horizontal locations of all existing utilities. Where existing utilities are found the Contractor shall hand dig those areas to avoid disruption. The Contractor shall be responsible for immediate repairs to existing underground utilities damaged during construction. The Contractor shall repair all existing asphalt, concrete and landscape surfaces damaged or removed during construction to match their original conditions. Where trenching extends through public streets or roadways, the Contractor shall notify underground service alert in addition to the independent locating service 48 hours before start of construction to determine location of existing utilities by calling (800) 422-4133.

#### **ARTICLE 14 CONCRETE**

- 14.1 Where used for structures to be provided under the contract such as bases, etc., concrete work, and associated reinforcing shall be as specified under Division 3 of these specifications.
- 14.2 See other sections for additional requirements for underground vaults, cable ducts, etc.

#### **ARTICLE 15 ACCESSIBILITY**

- 15.1 Install all control devices or other specialties requiring reading, adjustment, inspection, repairs, removal, or replacement conveniently and accessibly throughout the finished building.
- 15.2 All required access doors or panels in walls and ceilings are to be furnished and installed as part of the work under this Section. Refer to Division 1 of these specifications and as noted below.
- 15.3 Where located in fire rated assemblies, provide doors which match the rating of the assembly and are approved by the jurisdictional authority.
- 15.4 Refer to 'finish schedule' for types of walls and ceilings in each area and the architectural drawings for rated wall construction.
- 15.5 Coordinate work of the various sections to locate specialties requiring accessibility with others to avoid unnecessary duplication of access doors.

## **ARTICLE 16 FLASHING**

- 16.1 Flash and counter flash all conduits penetrating roofing membrane as shown on Architectural drawings. All work shall be in accordance with Division 7 of these specifications.

## **ARTICLE 17 IDENTIFICATION OF EQUIPMENT**

- 17.1 All electrical equipment shall be labeled, tagged, stamped, or otherwise identified in accordance with the following schedules:
  - 17.1.1 General:
    - 17.1.1.1 In general, the installed laminated nameplates as hereinafter called for shall also clearly indicate its use, areas served, circuit identification, voltage and any other useful data.
    - 17.1.1.2 All auxiliary systems, including communications, shall be labeled to indicate function.
  - 17.1.2 Lighting and Local Panelboards:
    - 17.1.2.1 Panel identification shall be with white and black micarta nameplates. Letters shall be no less than 3/8" high.
    - 17.1.2.2 Circuit directory shall be two column typewritten card set under glass or glass equivalent. Each circuit shall be identified by the room number and/or number of unit and other pertinent data as required.
  - 17.1.3 Distribution Switchboards and Feeders Sections:
    - 17.1.3.1 Identification shall be with 1" x 4" laminated white micarta nameplates with black lettering on each major component, each with name and/or number of unit and other pertinent data as required. Letters shall be no less than 3/8" high.

17.1.3.2 Circuit breakers and switches shall be identified by number and name with 3/8" x 1-1/2" laminated micarta nameplates with 3/16" high letters mounted adjacent to or on circuit breaker or switch.

17.1.4 Disconnect Switches, Motor Starters and Transformers:

17.1.4.1 Identification shall be with white micarta laminated labels and 3/8" high black lettering.

17.1.5 All communication system terminal boxes including T.V., telephone/intercom, security, fire alarm, clock, and computer networking shall be provided with white micarta laminated labels and 3/8" high black lettering.

## **ARTICLE 18 CONSTRUCTION FACILITIES**

18.1 Furnish and maintain from the beginning to the completion all lawful and necessary guards, railings, fences, canopies, lights, warning signs, etc. Take all necessary precautions required by City, State Laws, and OSHA to avoid injury or damage to any persons and property.

18.2 Temporary power and lighting for construction purposes shall be provided under this Section. All work shall be in accordance with Division 1 of these specifications.

## **ARTICLE 19 GUARANTEE**

19.1 Guarantee all material, equipment and workmanship for all sections under this Division in writing to be free from defect of material and workmanship for one year from date of final acceptance, as outlined in the general conditions. Replace without charge any material or equipment proven defective during this period. The guarantee shall include performance of equipment under all site conditions, conditions of load, installing any additional items of control and/or protective devices, as required.

## **ARTICLE 20 PATENTS**

20.1 Refer to the General Conditions for Contractor's responsibilities regarding patents.

## **ARTICLE 21 EQUIPMENT ROUGH-IN**

21.1 Rough-in all equipment, fixtures, etc. as designed on the drawings and as specified herein. The drawings indicate only the approximate location of rough-ins. Mounting heights of all switches, receptacles, wall mounted fixtures and such equipment must be coordinated with the Architectural Designs. The Contractor shall obtain all rough-in information before progressing with any work for rough-in connections. Minor changes in the contract drawings shall be anticipated and provided for under this Division of the specifications to comply with rough-in requirements.

## **ARTICLE 22 OWNER FURNISHED AND OTHER EQUIPMENT**

22.1 Rough-in and make final connections to all Owner furnished equipment shown on the drawings and specified, and all equipment furnished under other sections of the specifications.

## **ARTICLE 23 EQUIPMENT FINAL CONNECTIONS**

23.1 Provide all final connections for the following:

23.1.1 All equipment furnished under this Division.

23.1.2 Electrical equipment furnished under other sections of the specification.

23.1.3 Owner furnished equipment as specified under this Division.

## **ARTICLE 24 INSERTS, ANCHORS, AND MOUNTING SLEEVES**

24.1 Inserts and anchors must be:

24.1.1 Furnished and installed for support of work under this Division.

24.1.2 Mounting of equipment that is of such size as to be free standing and that equipment which cannot conveniently be located on walls, such as motor starters, etc., shall be rigidly supported on a framework of galvanized steel angle of Unistrut or B-line systems with all unfinished edges painted.

24.1.3 Furnish and install all sleeves as required for the installation of all work under all Sections of this Division and for all communication systems including any communication systems described in this Section which are bid to the General Contractor. Sleeves through floors, roof, and walls shall be as described in "Conduit and Fittings" Section 26 05 33.

## **ARTICLE 25 SEISMIC ANCHORING**

25.1 All switchgear and other free-standing electrical equipment or enclosures shall be anchored to the floor and braced at the top of the equipment to the structure. The Contractor shall submit drawings signed by the Contractor's registered structural Engineer indicating method of compliance prior to installation.

25.2 All sound systems, communication, signal or data networking equipment or enclosures shall be anchored to the structure. The Contractor shall submit drawings signed by the Contractor's registered Structural Engineer indicating method of compliance prior to installation.

## **ARTICLE 26 RUST PROOFING**

26.1 Rust proofing must be applied to all ferrous metals and shall be in accordance with Section 05500 of these specifications and as noted below.

26.1.1 Hot-dipped galvanized shall be applied and after forming of angle-iron, bolts, anchors, etc.

26.1.2 Hot-dipped galvanized coating shall be applied after fabrication for junction boxes and pull boxes cast in concrete.

## **ARTICLE 27 GENERAL WIRING**

27.1 Where located adjacent in walls, outlet boxes shall not be placed back to back, nor shall extension rings be used in place of double boxes, all to limit sound transmission between rooms. Provide short horizontal nipple between adjacent outlet boxes, which shall have depth sufficient to maintain wall coverage in rear by masonry wall.

- 27.2 In those instances where outlet boxes, recessed terminal boxes, or recessed equipment enclosures are installed in a fire rated assembly, provide "Flamesafe FSD 1077" fire stopping pads or approved equal, over the outlet or box.
- 27.3 Complete rough-in requirements of all equipment to be wired under the contract are not indicated. Coordinate with respective trades furnishing equipment or with the Architect as the case may be for complete and accurate requirements to result in a neat, workmanlike installation.

## **ARTICLE 28 SEPARATE CONDUIT SYSTEMS**

- 28.1 Each electrical and signal system shall be contained in a separate conduit system as shown on the drawings and as specified herein. This includes each power system, each lighting system, each signal system of whatever nature, telephone, standby system, sound system, control system, fire alarm system, etc.
- 28.2 Further, each item of building equipment must have its own run of power wiring. Control wiring may be included in properly sized conduit for equipment feeders of #6 AWG and smaller, having separate conduit for larger sizes.

## **ARTICLE 29 CLEANUP**

- 29.1 In addition to cleanup specified under other sections, thoroughly clean all parts of the equipment. Where exposed parts are to be painted, thoroughly clean off any spattered construction materials and remove all oil and grease spots. Wipe the surface carefully and scrape out all cracks and corners.
- 29.2 Use steel brushes on exposed metal work to carefully remove rust, etc., and leave smooth and clean.
- 29.3 During the progress of the work, keep the premises clean and free of debris.

## **ARTICLE 30 PAINTING**

- 30.1 Paint all unfinished metal as required in accordance with Division 1 of these specifications. (Galvanized and factory painted equipment shall be considered as having a sub-base finish.)

## **ARTICLE 31 GENERAL DEMOLITION REQUIREMENTS**

- 31.1 Remove existing work and items which are required to be removed in such manner that minimum damage and disturbance is caused to adjacent and connection work scheduled to remain. Repair or replace existing work schedule.
- 31.2 Include preparation of existing areas to receive new materials and removal of materials and equipment to alter or repair the existing building as indicated and as specified.
- 31.3 Perform demolition exercising proper care to prevent injury to the public, workmen and adjoining property.
- 31.4 Perform the removal, cutting, drilling of existing work with extreme care and use small tools in order not to jeopardize the structural integrity of the building.

- 31.5 Rebuild to existing condition or better, existing work which has to be removed to allow the installation of new work as required.
- 31.6 Remove, protect and reinstall existing items as indicated. Replace materials scheduled for reuse which are damaged by the Contractor to the extent that they cannot be reused, with equal quality material, and installation.
- 31.7 Do not reuse in this project materials and items removed from existing site or building, except with specific written approval by the Architect in each case, unless such removed material or item is specifically indicated or specified to be reused.
- 31.8 Remove materials and equipment indicated to be salvaged for reinstallation and store to prevent damage and reinstall as the work progresses. Do not reuse in this project, other materials and equipment removed from existing site or building, except with specific written approval by the Architect in each case.
- 31.9 Patch areas requiring patching, including damage caused by removing, relocating or adding fixtures and equipment, damages caused by demolition at adjacent materials.
- 31.10 Do not stockpile debris in the existing building, without the approval of the Architect. Remove debris as it accumulates from removal operations to a legal disposal area.
- 31.11 Contractor to assume existing oil filled and dry transformers, oil switches, ballasts, lamps, wooden poles, cross arms, computers, computer monitors, and conductor insulation containing materials considered hazardous. Comply with local, state and federal regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution. Contractor shall be responsible for removal of the above hazardous materials where encountered. Include all costs for such removal as part of this contract.
- 31.12 All fluorescent, compact fluorescent, high intensity discharge, metal halide, mercury vapor, high and low-pressure sodium, and neon lamps are to be disposed of as required by the California Waste Rule Regulations as described in the California Code of Regulations, Title 22, Division 4.5 and Chapter 23.
- 31.13 **Communication System:** Where new communication systems, (including telephone, intercom, clock, security, fire alarm, data, multimedia, CATV or lighting controls) are installed to replace existing systems, unless where otherwise directed the existing systems shall remain fully operational until the new system has been installed and tested. Demolition of the existing systems shall include removal of all equipment and associated wiring and exposed conduits and providing new blank covers for all abandoned device locations.
- 31.14 **Salvage Power Equipment:** The Contractor shall carefully remove all existing switchboards, panelboards, transformers, and confirm in writing which items the Owner wishes to keep. These items shall be transported to the Owner's maintenance facilities by the Contractor. All remaining items shall be disposed of by the Contractor.
- 31.15 **Salvage Lighting Equipment:** The Contractor shall confirm in writing which items the Owner wishes to keep. These items shall be transported to the Owner's maintenance facilities by the Contractor. All remaining items shall be disposed of by the Contractor.
- 31.16 **Salvage Communication Equipment:** The Contractor shall carefully remove all communication devices (telephone, intercom, clock, security, fire alarm, data, multimedia,

CATV or lighting controls) and box each type of devices separately. The Contractor shall deliver all items to the Owner's maintenance facility.

## **ARTICLE 32 PROJECT CLOSEOUT**

- 32.1 Prior to completion of project, compile a complete equipment maintenance manual for all equipment supplied under sections of this Division, in accordance with Division 1 of these specifications and as described below.
- 32.2 Equipment Lists and Maintenance Manuals:
  - 32.2.1 Prior to completion of job, Contractor shall compile a complete equipment list and maintenance manuals. The equipment list shall include the following items for every piece of material equipment supplied under this Section of the specifications:
    - 32.2.1.1 Name, model, and manufacturer.
    - 32.2.1.2 Complete parts drawings and lists.
    - 32.2.1.3 Local supply for parts and replacement and telephone number.
    - 32.2.1.4 All tags, inspection slips, instruction packages, etc., removed from equipment as shipped from the factory, properly identified as to the piece of equipment it was taken from.
- 32.3 Maintenance manuals shall be furnished for each applicable section of the specifications and shall be suitably bound with hard covers and shall include all available manufacturers' operating and maintenance instructions, together with "as-built" drawings to properly operate and maintain the equipment. The equipment lists and maintenance manuals shall be submitted in duplicate to the Architect for approval not less than 10 days prior to the completion of the job. The maintenance manuals shall also include the name, address, and phone numbers of all subcontractors involved in any of the work specified herein. Four copies of the maintenance manuals bound in single volumes shall be provided.

## **ARTICLE 33 RECORD DRAWINGS**

- 33.1 The Division 26 Contractor shall maintain record drawings as specified in accordance with Division 1 of these specifications, and as noted below.
- 33.2 Drawings shall show locations of all concealed underground conduit runs, giving the number and size of conduit and wires. Underground ducts shall be shown with cross section elevations and shall be dimensioned in relation to permanent structures to indicate their exact location. Drawing changes shall not be identified only with referencing CORs and RFIs, the drawings shall reflect all of the actual additions or changes made. All as-built drawing information shall be prepared by the contractor in AutoCAD, updating the contract computer files as needed to reflect actual installed conditions for all site plans, lighting, power, communication, networking, audio visual, security or fire alarms systems included in the scope of work for this project.
- 33.3 One set of these record drawings shall be delivered to the Architect. The engineer will review documents for completeness and will not be responsible for editing contractor computer files.

## ARTICLE 34 CHANGES AND EXTRA WORK

34.1 When **changes** in work are requested, the Division 26 Contractor shall provide unit prices for the work involved in accordance with Division 1 of these specifications, and the following:

34.1.1 The material Costs shall **not exceed** the latest edition of the "Trade Service" end column "C" price list. The materials prices may be higher only where the Contractor can produce invoices to substantiate higher material costs. The Contractor shall submit a print out copy of the trade service sheets with the change order to substantiate these values.

34.1.2 The labor Costs shall **not exceed** the latest edition of the "NECA Manual of Labor Units" **normal column**.

34.2 When **credits** in work are requested, the Division 26 Contractor shall provide unit prices for the work involved in accordance with Division 1 of these specifications, and the following:

34.2.1 The Material Costs shall **not be less than 80% of** the latest edition of the "Trade Service" end column price list. The materials prices may be lower only where the Contractor can produce invoices to substantiate lower material costs. Restocking fees may also be included in this amount where applicable.

34.2.2 The Labor Costs shall **not be less than 80% of** the latest edition of the "NECA Manual of Labor Units" **normal column**.

34.3 Conduit pricing for conduits of all types sized 3" or smaller.

When changes in the scope of work require the Contractor to estimate conduit Installations, they shall **NOT include labor values (only material cost may be included)** for any of the below items. The labor values for conduit installation represented in the NECA manual are inflated to a point where additional labor for the below items can not be justified.

34.3.1 Couplings.

34.3.2 Set Screw or Compression Fittings, locknuts, Bushings and washers.

34.3.3 Conduit straps and associated screws or nails.

34.3.4 LB fittings or other specialty fittings or specialty mounting hardware may be included where needed.

34.4 Wire pricing for all types and sizes.

When changes in the scope of work require the Contractor to estimate wire installations, they shall **NOT include labor values (only material cost may be included)** for any of the below items. The labor values for wire installation represented in the NECA manual are inflated to a point where additional labor for the below items can not be justified.

34.4.1 Locknuts, Bushings, tape, wire markers.

34.5 When changes in the scope of work require other equipment installations such as lighting fixtures, panelboards, switchboards, wiring devices, communications equipment etc. the

Contractor shall **NOT include labor values (only material cost may be included)** for any of the below items. The labor values for these equipment items represented in the NECA manual are inflated to a point where additional labor for the below items can not be justified.

34.5.1 Associated screws, nails, bolts, anchors or supports.

34.5.2 Locknuts, washers, tape.

34.6 The total labor hours for extra work will be required to be calculated as follows:

34.6.1 Change orders with 1 to 30 total labor hours

|                 |     |                      |
|-----------------|-----|----------------------|
| General Laborer | 10% | of total labor hours |
| Journeyman      | 10% | of total labor hours |
| Foreman         | 80% | of total labor hours |

34.6.2 Change orders with 31 to 100 total labor hours

|                 |     |                      |
|-----------------|-----|----------------------|
| General Laborer | 20% | of total labor hours |
| Journeyman      | 40% | of total labor hours |
| Foreman         | 40% | of total labor hours |

34.6.3 Change orders with over 100 total labor hours

|                 |     |                      |
|-----------------|-----|----------------------|
| General Laborer | 30% | of total labor hours |
| Journeyman      | 50% | of total labor hours |
| Foreman         | 20% | of total labor hours |

34.7 When change orders are issued which allow the work to be completed in the normal sequence of construction, the labor rates shall be based on the most current "Prevailing Wage" – straight time total hourly rate. When change orders require the Contractor to work out of sequence the "Prevailing Wage"– daily overtime hourly rate shall apply. Special condition situations shall be reviewed on an individual basis for alternate hourly rate schedules.

34.8 Costs **will not** be permitted for additional supervision on site or office time for processing any change order other than the 10% overhead allowance as described in Division 1. Cost for special equipment required to install items for an individual change order are permitted and must be individually identified. Lump Sum cost for small tools or any other cost not specifically required for the change order are **not** permitted.

34.9 Contractor estimates shall be formatted to clearly identify each of the following:

34.9.1 Line item description of each type of material or labor item.

34.9.2 Description of quantity for each item.

34.9.3 Description of (material cost per / quantity).

34.9.4 Description of (labor cost per / quantity).

34.9.5 Description of total labor hour breakdown per Foreman, Journeyman or General Laborer as described above.

## ARTICLE 35 ELECTRONIC FILES

- 35.1 The Contractor shall make a **written** request directly to Johnson Consulting Engineers for electronic drawing files. As a part of the written request, please include the following information:
- 35.1.1 Clearly indicate each drawing sheet needed (i.e., E1.1, E2.1, etc.).
  - 35.1.2 Identify the name, phone number, mailing address and e-mail address of the person to receive the files.
  - 35.1.3 Provide written confirmation and agreement with the requirements described for payment of computer files, as described below.
- 35.2 Detail or riser diagram sheets, or any other drawings other than floor plans or site plans, **will not be made available to the Contractor.**
- 35.3 Files will only be provided in the AutoCAD format in which they were created.
- 35.4 Requests for files will be processed as soon as possible; a minimum of 7 working days should be the normal processing time. The Contractor shall be completely responsible for requesting the files in time for their use.

**END OF SECTION**

**SECTION 26 0519**  
**POWER CONDUCTORS**

**PART 1 – GENERAL**

- 1.1 Furnish and install wire and cable for branch circuits and feeders specified herein and as shown on the electrical drawings.
- 1.2 Submittals: Submit manufacturers' data for the following items:
  - 1.2.1 All cables and terminations
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining, or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed

**PART 2 – PRODUCTS**

- 2.1 Wire and cable Rated 120 volt to 600 volt.
  - 2.1.1 All wire and cable shall be new, 600 volt insulated copper, of types specified below for each application. All wire and cable shall bear the UL label and shall be brought to the job in unbroken packages. Wire insulation shall be the color as specified herein and shall be type THWN-2. Insulated conductors shall be installed in all exterior exposed raceways. Conductors for branch circuit lighting, receptacle, power and miscellaneous systems shall be a minimum of No. 12 AWG. Increase conductor size to No. 10 AWG for 120 volt circuits greater than 100 feet from the panel to the load and for 277 volt circuits greater than 200 feet from the panel to the load. Circuit home-runs indicated to be larger than No. 12 must be increased the entire length of the circuit, including equipment grounding conductor. Wire sizes No. 14 through No. 10 shall be solid. No. 8 and larger shall be stranded.
  - 2.1.2 Aluminum conductors will not be permitted.
  - 2.1.3 MC type armored cable reference Section 26 05 33.
- 2.2 Wire and cable for systems below 120 volts.
  - 2.2.1 All low voltage and communications systems cables routed underground shall be provided with a moisture resistant outer jacket, West Penn "Aquaseal" or equal, unless otherwise specified.

### PART 3 - EXECUTION

- 3.1 Wire and cable shall be pulled into conduits without strain using powdered soapstone, mineralac, or other approved lubricant. In no case shall wire be repulled if same has been pulled out of a conduit run for any purpose. No conductor shall be pulled into conduit until conduit system is complete, including junction boxes, pull boxes, etc.
- 3.2 All connections of wires shall be made as noted below:
- 3.2.1 Connections to outlets and switches: Wire formed around binding post of screw.
- 3.2.2 No. 10 wire and smaller: Circuit wiring connections to lighting fixtures and other hard wired equipment shall be made with pressure type solderless connectors, Buchanan, Scotchlock, Wing Nut, or approved equal. Alternate "WAGO" #773 series or "IDEAL" #32, 33, 34 and 39 series push wire style connectors are also acceptable.
- 3.3 All wiring shall be continuous without splicing unless where specifically noted on the drawings or where permitted below.
- 3.3.1 No. 10 wire and smaller above grade: Quantities as needed, connection made with pressure type solderless connectors, Scotchlock or equal.
- 3.3.2 No. 10 wire and smaller below grade: Quantities as needed, connection made with 'Raychem' long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).
- 3.3.3 No. 8 wire and larger above grade: Quantities only where indicated, 'Raychem' long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).
- 3.3.4 No. 8 wire and larger below grade: Quantities only where indicated, 'Raychem' long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).
- 3.4 All wiring throughout shall be color coded as follows:
- |         | <u>480 volt system</u> | <u>208 or 240 volt system</u> |
|---------|------------------------|-------------------------------|
| A Phase | Brown                  | Black                         |
| B Phase | Orange                 | Red                           |
| C Phase | Yellow                 | Blue                          |
| Neutral | Grey                   | White                         |
| Ground  | Green                  | Green                         |
- 3.5 Wiring must be color coded throughout its entire length, except feeders may have color coded plastic tape at both ends and any other accessible point.

- 3.6 All control wiring in a circuit shall be color coded, each phase leg having a separate color, and with all segments of the control circuit, whether in apparatus or conduit, utilizing the same color coding.
- 3.7 At all terminations of control wiring, the wiring shall have a numbered T&B or Brady plastic wire marker.
- 3.8 Cables when installed are to be properly trained in junction boxes, etc., and in such a manner as to prevent any forces on the cable which might damage the cable.
- 3.9 All conductors to be installed into a common raceway, shall be pulled into the raceway at the same time.
- 3.10 All conductors shall be installed in such a manner as to not exceed the manufacturers' recommended pulling tension and bending radius. The equipment used for pulling must be specifically designed for the purpose. Motorized vehicles such as pickup trucks, are not acceptable.

**END OF SECTION**

**SECTION 26 0526**  
**GROUNDING**

**PART 1 – GENERAL**

- 1.1 Furnish and install grounding and grounding conductors and electrodes as specified herein and as shown on the drawings.
- 1.2 Submit catalog data for all components.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

**PART 2 – EXECUTION**

- 2.1 Grounding
  - 2.1.1 All panelboard cabinets, equipment, enclosures, and complete conduit system shall be grounded securely in accordance with pertinent sections of CEC Article 250. Conductors shall be copper. All electrically operated equipment shall be bonded to the grounded conduit system. All non-current carrying conductive surfaces that are likely to become energized and subject to personal contact shall be grounded by one or more of the methods detailed in CEC Article 250. All ground connections shall have clean contact surfaces. Install all grounding conductors in conduit and make connections readily accessible for inspection.
  - 2.1.2 Provide an insulated equipment grounding conductor in all branch circuit and feeder raceway systems, sized in accordance with CEC 250-1122.
  - 2.1.3 Provide an additional individual insulated grounding conductor for each circuit which contains an isolated ground receptacle or surge suppression receptacle.
  - 2.1.4 Grounding of metal raceways shall be assured by means of provisions of grounding bushings on feeder conduit terminations at the panelboard, and by means of insulated continuous stranded copper grounding wire extended from the ground bus in the panelboard to the conduit grounding bushings.
  - 2.1.5 Except for connections which access for periodic testing is required, make grounding connections which are buried or otherwise inaccessible by exothermite type process.
  - 2.1.6 The following ohmic values shall be test certified for each item listed. A written report signed and witnessed by the project IOR shall be provided to the engineer.

If the ohmic value listed cannot be obtained additional grounding shall be installed to reach the value listed.

2.1.6.1 Service. . . . .10 ohms.

2.1.6.2 Step down transformers and non-current carrying metal parts  
. . . . . 25 ohms.

2.1.6.3 Manholes, handholes, etc.  
. . . . . 10 ohms.

**END OF SECTION**

**SECTION 26 0533**  
**CONDUIT AND FITTINGS**

**PART 1 – GENERAL**

- 1.1 Furnish and install conduit and fittings as shown on the drawings and as specified herein.
- 1.2 Submit Manufacturer's data on the following:
  - 1.2.1 Conduit.
  - 1.2.2 Fittings
  - 1.2.3 Fire stopping Material.
  - 1.2.4 Surface Raceways.
  - 1.2.5 Type MC cable, provide construction details and UL "E" number.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

**PART 2 – PRODUCTS**

- 2.1 Rigid steel conduit, intermediate metal conduit (IMC), electrical metallic tubing (EMT) and flexible metallic conduit shall be steel, hot dipped galvanized after fabrication.
- 2.2 PVC conduit shall be Carlon or approved equal.
- 2.3 Liquid tight flexible metal conduit shall be Anaconda Sealtite type UA or approved equal. Fittings shall be Appleton, Crouse-Hinds, Steel City, T&B, or equivalent.
- 2.4 MC type armored cable, when utilized, shall be provided with the following:
  - 2.4.1 Comply with UL 1479 and CEC 330-22(c).
  - 2.4.2 90°C, copper, THHN conductors.
  - 2.4.3 Minimum #12 insulated grounding conductor.
  - 2.4.4 Conductors sized No. 10 and smaller shall be solid, No. 8 and larger shall be stranded.
  - 2.4.5 Oversized (150%) neutrals or separate neutrals shall be provided.

- 2.4.6 Increase phase conductors to No. 10 AWG for 120 volt circuits greater than 100 feet from panel to load and for 277 volt circuits greater than 200 feet from panel to load. Where required increase conductor sizes for entire length of circuit.
- 2.4.7 Interlocked armored aluminum sheath.
- 2.4.8 AC or BX type armored cable shall not be substituted in lieu of MC type cable.
- 2.4.9 Color code cable according to cable type and configuration.
- 2.4.10 Acceptable manufacturers are AFC and Alfex.
- 2.5 Fire stopping material shall provide an effective seal against fire, heat, smoke and fire gases. Fire stopping material shall be tested to comply with ASTM E 814 and UL 1479. The submittal for this product shall include the UL listed system number and installation requirements for each type of penetration seal required for this project.
- 2.6 Each length of conduit shall be stamped with the name or trademark of the manufacturer and shall bear the UL label.
- 2.7 All plastic conduit shall be rigid, schedule 40, heavy wall PVC. All PVC conduit shall be UL listed. Underground utility company conduits shall comply with local utility co. requirements.
- 2.8 Plastic conduit shall be stored on a flat surface and protected from the direct rays of the sun.
- 2.9 Where branch circuit or communication raceways cannot be concealed in ceilings or walls and are required to be exposed in interior spaces, provide nonmetallic surface raceway system sized per the manufacturer capacity requirements. A full complement of nonmetallic fittings must be available and matching device boxes and cover plates must be provided. The color of the raceway system, components and boxes shall be (white). Where data networking cabling is to be installed, all raceway fittings shall meet Category 5 radius requirements. Where specific raceway types have been noted on the drawings they shall be as follows:
- |       |              |                                                   |                                                                         |
|-------|--------------|---------------------------------------------------|-------------------------------------------------------------------------|
| 2.9.1 | System 'SR'  | Hubbell<br>Wiremold<br>Panduit<br>Hellerman-Tyton | WALLTRAK 1 series<br>ECLIPSE PN05series<br>LD5 series<br>TSR2 series    |
| 2.9.2 | System 'SR2' | Hubbell<br>Wiremold<br>Panduit<br>Hellerman-Tyton | WALTRAK 22<br>2300D Series<br>D2P10<br>TSR3 series                      |
| 2.9.3 | System 'SR3' | Hubbell<br>Wiremold<br>Panduit<br>Hellerman-Tyton | BASETRAK series<br>5400 - series<br>70 series<br>MCR Infostream" series |
- Provide with offset boxes, inline boxes may only be used where specifically shown on the drawings.

### **PART 3 – FITTINGS**

- 3.1 All metallic fittings, including those for EMT, flexible conduit, or malleable iron. Die cast fittings of any other material are not permitted.
- 3.2 Locknuts shall be steel or malleable iron with sharp clean-cut threads.
- 3.3 Entrance seals shall be O.Z. type FSK or equivalent.
- 3.4 Bushings and locknuts: Where conduits enter boxes, panels, cabinets, etc., they shall be rigidly clamped to the box by locknuts on the outside, and a lock nut and plastic bushing on the inside of the box. All conduits shall enter the box squarely.
- 3.5 Furnish and install insulated bushings as per CEC article No. 300 - 4 (F) on all conduits. The use of insulated bushings does not exclude the use of double locknuts to fasten conduit to the box.
- 3.6 Transition from plastic to steel conduits shall be with PVC female threaded adaptors.
- 3.7 Couplings and connectors for rigid steel or IMC conduit must be threaded, or compression type (set screw fittings are not permitted).
- 3.8 Couplings and connectors for EMT shall be compression, watertight. Set screw connectors are not acceptable, except for systems below 120 volts.
- 3.9 MC type armored cable shall be provided with listed clamp type die cast zinc set screw connectors. Anti-short bushings shall be provided at all cable ends.
- 3.10 Connectors for flexible metal conduit shall be steel or malleable iron with screw provided to clinch the conduit into the adapter body. For sizes up to ¾" a screw-in, "Jake type," fitting may be used.
- 3.11 Install approved expansion fittings, or liquid tight flex conduit with a minimum 6" slack for conduits passing through all expansion and seismic joints.

### **PART 4 - EXECUTION**

- 4.1 All branch circuits shall be installed concealed in walls or above ceilings or in concrete floor slabs. PVC conduits installed in concrete floor slabs shall transition to PVC coated rigid steel where conduits penetrate above finished grade or finished floor.
- 4.2 Conduit sizes for various numbers and sizes of wire shall be as required by the CEC, but not smaller than ½" for power wiring and ¾" for communications and fire alarm systems unless otherwise noted. Conduit in slab or below grade shall be ¾" minimum trade size, unless otherwise identified.
- 4.3 Conduit size shall be such that the required number and sizes of wires can be easily pulled in and the Contractor shall be responsible for the selection of the conduit sizes to facilitate the ease of pulling. Conduit sizes shown on the drawings are minimum sizes in accordance with appropriate tables in the CEC. If because of bends or elbows a larger conduit size is required, the Contractor shall so furnish without further cost to the Owner.
- 4.4 The Contractor shall be entirely responsible for the proper protection of this work from the other trades on the job. When conduit becomes bent or holes are punched through same, or outlets moved after being roughed-in, the Contractor shall replace same, without additional cost to the Owner.

- 4.5 Rigid steel conduit or IMC shall be used as follows:
  - 4.5.1 Exposed exterior locations.
  - 4.5.2 Exposed interior locations below eight feet above floor, except in electrical rooms and closets.
  - 4.5.3 In hazardous or classified areas as required by CEC.
- 4.6 EMT conduit shall be used for areas as follows:
  - 4.6.1 All interior communications, signal, and data networking systems.
  - 4.6.2 All interior power wiring systems where not required to be in rigid steel, IMC or flexible conduit.
- 4.7 Flexible conduit shall be used for areas as follows:
  - 4.7.1 To connect motors, transformers, and other equipment subjected to vibration or where specifically detailed on the drawings.
  - 4.7.2 Flexible conduit shall not be used to replace EMT in other locations where the conduit will be exposed.
  - 4.7.3 Flexible metal conduit shall be ferrous. Installation shall be such that considerable slack is realized. The conduit shall contain separate code sized grounding conductor.
  - 4.7.4 Liquid tight flexible conduit shall be used in conformance with CEC in lengths not to exceed 4'. For equipment connections, route the conduit at 90 degrees to the adjacent path for point of connection. The conduit shall contain separate code sized grounding conductor. Use liquid tight flexible conduit for all equipment connections exposed in possible wet, corrosive or oil contaminated areas, e.g., shops and outside areas.
- 4.8 MC armored cable may be used as follows:
  - 4.8.1 All branch circuit wiring for lighting and power circuits where permitted and installed in compliance with UL 1569 and CEC 330.
- 4.9 MC armored cable shall **not** be used for the following areas:
  - 4.9.1 Home runs shall not be MC cable.
  - 4.9.2 Any exterior, underground or buried in concrete circuits.
  - 4.9.3 Any circuits feeding HVAC equipment or pumps or any circuit with 30 AMPs or greater overcurrent protection.
  - 4.9.4 Any exposed interior locations except in electrical, communication or mechanical equipment rooms.
  - 4.9.5 Any exposed interior damp/wet locations, kitchens, science classrooms, shop areas, or concealed in science classroom casework, unless provided with approved PVC jacket.

4.9.6 Any hazardous rated area.

- 4.10 Plastic conduit shall be used for all exterior underground, in slab, and below slab on grade conduit installations. Install bell ends at all conduit terminations in manholes and pull boxes. Where plastic conduit transitions from below grade to above grade, no plastic conduit shall extend above finished exterior grade, or above interior finished floor level.
- 4.11 Plastic conduit joints shall be made up in accordance with the manufacturer's recommendations for the particular conduit and coupling selected. Conduit joint couplings shall be made watertight. Plastic conduit joints shall be made up by brushing a plastic solvent cement on the inside of a plastic fitting and on the outside of the conduit ends. The conduit and fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly.
- 4.12 All underground conduit depths shall be as detailed on the drawings or a minimum of 30" below finished grade (when not specifically detailed otherwise), for all exterior underground conduits. Where concrete slurry or concrete encasement is provided, include "Red" color dye in mixture.
- 4.13 All underground conduits for power systems (600v and higher), shall be concrete encased and a minimum of 48" below grade or as detailed on the drawings. Where concrete slurry or concrete encasement is provided, include "Red" color dye in mixture.
- 4.14 Conduit shall be continuous from outlet to outlet, cabinet or junction box, and shall be so arranged that wire may be pulled in with the minimum practical number of junction boxes.
- 4.15 All conduits shall be concealed wherever possible. All conduit runs may be exposed in mechanical equipment rooms, electrical equipment rooms, electrical closets, and in existing or unfinished spaces. No conduit shall be run exposed in finished areas without the specific approval of the Architect.
- 4.16 All raceways which are not buried or embedded in concrete shall be supported by straps, clamps, or hangers to provide a rigid installation. Exposed conduit shall be run in straight lines at right angles to or parallel with walls, beams, or columns. In no case shall conduit be supported or fastened to other pipes or installed to prevent the ready removal of other trades piping. Wire shall not be used to support conduit.
- 4.17 It shall be the responsibility of the Contractor to consult the other trades before installing conduit and boxes. Any conflict between the location of conduit and boxes, piping, duct work, or structural steel supports, shall be adjusted before installation. In general, large pipe mains, waste, drain, and steam lines shall be given priority.
- 4.18 Conduits above lay-in grid type ceilings shall be installed in such a manner that they do not interfere with the "lift-out" feature of the ceiling system. Conduit runs shall be installed to maintain the following minimum spacing wherever practical.
- 4.18.1 Water and waste piping not less than 3".
- 4.18.2 Steam and steam condensate lines not less than 12".
- 4.18.3 Radiation and reheat lines not less than 6".
- 4.19 Provide all necessary sleeves and chases required where conduits pass through floors or walls as part of the work of this section. Core drilling will only be permitted where approved by the Architect.

- 4.20 All empty conduits and surface mounted raceways shall be provided with a ¼" polypropylene plastic pull cord and threaded plastic or metal plugs over the ends. Fasten plastic "Dymo" tape label to exposed spare conduit to identify "power" or "communication" system, and to where it goes.
- 4.21 The ends of all conduits shall be securely plugged, and all boxes temporarily covered to prevent foreign material from entering the conduits during construction. All conduit shall be thoroughly swabbed out with a dry swab to remove moisture and debris before conductors are drawn into place.
- 4.22 Bending: Changes in direction shall be made by bends in the conduit. These shall be made smooth and even without flattening the pipe or flaking the finish. Bends shall be of as long a radius as possible, and in no case smaller than CEC requirements.
- 4.22.1 For power conduits for conductors (600v and below), provide minimum 36" radius (vertical) and 72" radius (horizontal) bends.
- 4.22.2 For power conduits for conductors (greater than 600v), provide minimum 72" radius (vertical) and 72" radius (horizontal) bends.
- 4.23 Supports: Conduit shall be supported at intervals as required by the California Electrical Code. Where conduits are run individually, they shall be supported by approved conduit straps or beam clamps. Straps shall be secured by means of toggle bolts on hollow masonry, machine screws or bolts on metal surfaces, and wood screws on wood construction. **No perforated straps or wire hangers of any kind will be permitted. Where individual conduits are routed, or above ceilings, they shall be supported by hanger rods and hangers.** Conduits installed exposed in damp locations shall be provided with clamp backs under each conduit clamp, to prevent accumulation of moisture around the conduits.
- 4.24 Where a number of conduits are to be run exposed and parallel, one with another, they shall be grouped and supported by trapeze hangers. Hanger rods shall be fastened to structural steel members with suitable beam clamps or to concrete inserts set flush with surface. A reinforced rod shall be installed through the opening provided in the concrete inserts. Beam clamps shall be suitable for structural members and conditions. Rods shall be galvanized steel 3/8" diameter minimum. Each conduit shall be clamped to the trapeze hanger with conduit clamps.
- 4.25 All concrete inserts and pipe clamps shall be galvanized. All steel bolts, nuts, washers, and screws shall be galvanized or cadmium plated. Individual hangers, trapeze hangers and rods shall be prime-coated.
- 4.26 Openings through fire rated floors/walls and/or smoke walls through which conduits pass shall be sealed by Fire stopping material to comply with Division 1 to seal off flame, heat, smoke and fire gases. Sleeves shall be provided for power or communication system cables which are not installed in conduits, and shall be sealed inside and out to comply with manufacturers UL system design details. Where multiple conduits and/or cable tray systems pass thru fire-rated walls at one location, the Contractor shall submit copies of the manufacturers UL system design details proposed for use on this project. All Fire stopping material shall have an hourly fire-rating equal to or higher than the fire rating of the floor or wall through which the conduit, cables, or cable trays pass.
- 4.27 Provide cap or other sealing type fitting on all spare conduits. Conduits stubbed into buildings from underground where cable only extends to equipment, the conduit/cable end shall be sealed to prevent moisture from entering the room or space.

- 4.28 All conduits which are part of a paralleled feeder or branch circuit shall be installed underground.
- 4.29 All conduits which are required as a part of systems specified in Divisions 27 or 28, or any other low voltage communication systems, shall be furnished and installed by the Division 26 Contractor.
  - 4.29.1 The Contractor shall coordinate all conduit requirements with each system supplier prior to bid to determine special conduit system requirements.
  - 4.29.2 The Contractor shall provide a pull rope in all conduits for these systems.
  - 4.29.3 The Contractor shall provide conduit sleeves for all open cable installations thru rated walls or block walls. Provide conduit from each building main termination cabinet or backboard to the nearest accessible ceiling for access into all electrical or communications rooms.
- 4.30 In addition to the above requirements, the following requirements shall apply to all data networking conduits:
  - 4.30.1 Flexible metal conduit may only be used where required at building seismic and/or expansion joints.
  - 4.30.2 All underground conduits shall be provided with minimum 24" radius elbows (vertical) and 60" (horizontal).
  - 4.30.3 No length of conduit above grade shall be installed to exceed 150 feet between pull boxes, or points of connection, unless where specifically detailed on the drawings.
  - 4.30.4 No length of conduit shall be installed to exceed two 90 degree bends between pull boxes, or points of connection, unless where specifically detailed on the drawings.
- 4.31 Where surface raceways are installed in interior spaces, the Contractor shall take care to route in straight lines at right angles to or parallel with walls, beams, or columns. All raceways and device boxes shall be securely screwed to the finish surface with zinc screw "Auger" anchors Stk #ZSA1K by Gray Bar Electric or equal. Tape adhesive application will not be permitted.
- 4.32 The Contractor who installs surface raceway systems shall provide and install complete with wire retention clips, one for every (8) vertical feet or (5) horizontal feet or portion thereof. This Contractor shall also provide each raceway channel with pull strings.
- 4.33 It shall be the responsibility of the Contractor installing the raceway to coordinate the installation of raceway device plates and inserts with the communications or data contractors.
- 4.34 MC cable shall be cut using a specific metallic sheath armor stripping tool. The use of hacksaws, dikes or any other tools not specifically designed to remove the armor sheath will not be permitted.
- 4.35 MC cables installed in attic spaces or above lay-in ceilings shall be installed to be protected from physical damage. The cable shall be mounted along the sides or bottom of joists, rafters or studs.

- 4.36 Support wires used for supporting ceilings, lighting fixtures or other equipment items shall **not** be used to support MC cables. Conduits, duct work, piping or any other equipment shall not be used to support or mount MC cables.
- 4.37 MC cable supports, fasteners and clips shall be designed specifically for use with MC cables. Standard conduit supports, fasteners and clips, nails or other items are not permitted for installing MC cables.

**END OF SECTION**

**SECTION 26 0534**  
**OUTLET AND JUNCTION BOXES**

**PART 1 – GENERAL**

- 1.1 Furnish and install electrical wiring boxes as specified and as shown on the electrical drawings.
- 1.2 Submit manufacturer's data for all items.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

**PART 2 – PRODUCTS**

- 2.1 Boxes shall be as manufactured by Steel City, Appleton, Raco, or approved equal.
- 2.2 All boxes must conform to the provisions of Article 370 of the CEC. All boxes shall be of the proper size to accommodate the quantity of conductors enclosed in the box. Minimum box size shall be 4" square x 1-½" deep.
- 2.3 Boxes generally shall be hot dipped galvanized steel with knockouts. Boxes on exterior surfaces or in damp locations shall be corrosion resistant, cast ferrous and shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Boxes shall be Appleton Type FS, Crouse-Hinds, or the approved equal. Conduit bodies shall be corrosion resistant, cast malleable iron. Conduit bodies shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Conduit bodies shall be Appleton Unilets, Crouse-Hinds, or the approved equal. Where recessed, boxes shall have square cut corners.
- 2.4 Deep boxes shall be used in wall covered by wainscot or paneling and in walls or glazed tile, brick, or other masonry which will not be covered with plaster. Through the wall type boxes shall not be used unless specifically called for. All boxes shall be nongangable. Boxes in concrete shall be of a type to allow the placing of conduit without displacing the reinforcing bars. All lighting fixture outlet boxes shall be equipped with the proper fittings to support and attach a light fixture.
- 2.5 All light, switch, receptacle, and similar outlets shall be provided with approved boxes, suitable for their function. Back boxes shall be furnished and installed as required for the equipment and/or systems under this contract.

- 2.6 Pull and junction boxes shall be code gauge boxes with screw covers. Boxes shall be rigid under torsional and deflecting forces and shall be provided with angle from framing where required. Boxes shall be 4" square with a blank cover in unfinished areas and with a plaster ring and blank cover in finished areas. Covers for flush mounted oversize boxes shall extend  $\frac{3}{4}$ " past boxes all around. Covers for 4" square boxes shall extend  $\frac{1}{4}$ " past box all around.
- 2.7 All terminal cabinets and junction boxes or equipment back boxes which are required as a part of systems specified in Divisions 27 or 28, or any other low voltage communication systems, shall be furnished and installed by the Division 26 Contractor.
- 2.7.1 The Division 26 Contractor shall coordinate all box requirements with each system supplier prior to bid to determine special cabinet or back box requirements. The Contractor shall also provide stainless steel blank cover plates for all low voltage systems installed for future equipment.
- 2.7.2 The Contractor shall provide all plywood backboards indicated on walls or inside equipment enclosures. All backboards shall be a minimum of  $\frac{3}{4}$ " thick fire rated type plywood.
- 2.7.3 The Contractor shall coordinate exact rough in locations and requirements with each system supplier.
- 2.8 In addition to the above requirements, boxes for data networking wiring and equipment shall comply with the following:
- 2.8.1 All boxes shall be a minimum of 4-11/16" square x 2-1/8" deep.
- 2.8.2 Where pull boxes are required on individual conduits 1- $\frac{1}{4}$ " or smaller, provide 4-11/16" square x 2-1/8" deep boxes. Where pull boxes are required on conduits larger than 1- $\frac{1}{4}$ " for straight pull through, provide eight times the conduit trade size for box length. Where pull boxes are required on conduits larger than 1- $\frac{1}{4}$ " for an angle or a U-pull through installation, provide a minimum distance of six times the conduit trade size between the entering and exiting conduit run for each cable.
- 2.9 Recessed boxes installed in fire rated floors/walls and /or smoke walls shall be sealed by Fire stopping material to comply with Division 1 to seal off flame, heat, smoke and fire gases. The Contractor shall submit copies of the manufacturers UL system design details proposed for use on this project. All Fire stopping material shall have an hourly fire-rating equal to or higher than the fire rating of the floor or wall through which the conduit, cables, or cable trays pass.

### **PART 3 – EXECUTION**

- 3.1 Boxes shall be installed where required to pull cable or wire, but in finished areas only by approval of the Architect. Boxes shall be rigidly attached to the structure, independent of any conduit support. Boxes shall have their covers accessible. Covers shall be fastened to boxes with machine screws to ensure continuous contact all around. Covers for surface mounted boxes shall line up evenly with the edges of the boxes.
- 3.2 Outlets are only approximately located on the plans and great care must be used in the actual location of the outlets by consulting the various detailed drawings and specifications. Outlets shall be flush with finished wall or ceiling, boxes installed symmetrically on such trim or fixture. Refer to drawings for location and orientation of all outlet boxes.

- 3.3 Furnish and install all plaster rings as may be required. Plaster rings shall be installed on all boxes where the boxes are recessed. Plaster rings shall be of a depth to reach the finished surface. Where required, extension rings shall be installed so that the plaster ring is flush with the finished surface.
- 3.4 All cabinets and boxes shall be secured by means of toggle bolts on hollow masonry; expansion shields and machine screws or standard precast inserts on concrete or solid masonry; machine screws or bolts on metal surfaces and wood screws on wood construction. All wall and ceiling mounted outlet boxes shall be supported by bar supports extending from the studs or channels on either side of the box. Boxes mounted on drywall or plaster shall be secured to wall studs or adequate internal structure.
- 3.5 Boxes with unused punched-out openings shall have the openings filled with factory-made knockout seals.
- 3.6 Where standby power and normal power are to be located in the same outlet box or 480V in a switch box, install partition barriers to separate the various systems.
- 3.7 All outlet boxes and junction boxes for fire alarm system shall be painted red.

**END OF SECTION**

**SECTION 26 0543**  
**UNDERGROUND PULL BOXES AND MANHOLES**

**PART 1 – GENERAL**

- 1.1 Furnish and install electrical underground pullboxes and manholes as specified and as shown on the electrical drawings.
- 1.2 Submit manufacturer's data for all items.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements or "to be determined later" statements. The products being submitted must be the products installed.

**PART 2 – PRODUCTS**

- 2.1 The concrete for pull boxes and manholes shall be class 5500 psi or as noted on the drawings. All pullboxes and manholes and covers located in parking lots, driveways, roads, or any other driveable areas shall be traffic rated.
- 2.2 Each manhole shall be provided with a fiberglass ladder and ground rod. Ground rods shall be copper or a copper-clad steel 3/4" diameter by 10-feet long. All non-current carrying metallic components shall be grounded to the ground rods with minimum #6 copper wire.
- 2.3 All underground pullboxes shall be provided with steel bolt down type covers. Bolts shall be bronze or brass. All communication or signal system pullboxes shall be sized to comply with CEC Article 370 unless where other sizes are specifically noted on the drawings.
- 2.4 All underground pullbox and manhole covers shall be provided with either "electrical" or "telephone" or "fire alarm" markings. The telephone marking shall be used to identify telephone, T.V., clock or any other types of communication systems.
- 2.5 All power and communication systems shall be provided with separate pullboxes or manholes. Fire alarm circuits shall also be provided with separate pullboxes from any other type of communication systems.

**PART 3 – INSTALLATION**

- 3.1 Shoring of the excavation shall be in accordance with all federal, state and local regulations.
- 3.2 Provide sealing material for the joints between sections per manufacturer's instructions.

- 3.3 The contractor shall make the top and access assembly or lid flush with surrounding areas where installed in driveable or normal walking areas.

**END OF SECTION**

**SECTION 26 0800**  
**COMMISSIONING OF ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, 27, 28 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Acceptance and start-up testing requirements for electrical power distribution equipment and systems. Contractor shall retain and pay for the services of a recognized, independent testing firm for the purpose of performing inspections and tests as herein specified and as required by code.
  - 1. The testing firm shall provide all material, equipment, labor, and technical supervision to perform such tests and inspections.
  - 2. It is the purpose of these tests to assure that all tested electrical equipment is operational and within industry and manufacturers tolerances, and is installed in accordance with design specifications.
  - 3. The tests and inspections shall determine suitability for start-up and energization.
  - 4. The following equipment shall be tested and calibrated.
    - a. Low voltage switches, fuses, and circuit breakers, 100A frame and larger.
    - b. Low voltage cables and feeders.
    - c. Motor Control Centers and adjustable frequency drives.
    - d. Protective relays, instruments, and metering systems.
    - e. Grounding systems and ground fault protection systems.

**1.3 CODES, STANDARDS, AND REFERENCES**

- A. All inspections and tests shall be in accordance with the following codes and standards except as provided otherwise herein.
  - 1. ANSI/IEEE C2: National Electrical Safety Code (NESC).
  - 2. ANSI/NFPA 70: National Electrical Code, with California Amendments (CEC).
  - 3. ANSI/NFPA 70E: Standard for Electrical Safety in the Workplace.
  - 4. ANSI/NFPA 78: Lightning Protection Code.
  - 5. ANSI/NFPA 101: Life Safety Code.
  - 6. American Society for Testing and Materials – ASTM.
  - 7. Applicable State and Local Codes, Ordinances and Standards, including City of San Diego, San Diego Gas & Electric, and San Diego Unified School District.
  - 8. California Code of Regulations (CCR), Title 8, Title 24.
  - 9. Division 1, Section 019113, "General Commissioning Requirements".
  - 10. Institute of Electrical and Electronic Engineers – IEEE.
  - 11. Insulated Cable Engineers Association – ICEA.

12. International Electrical Testing Association - NETA Accept: The NETA Acceptance Testing Specifications, latest edition.
13. National Electrical Manufacturers Association – NEMA.
14. Occupational Safety and Health Administration (OSHA) – 29 CFR 1910.7: OSHA Occupational Safety and Health Standards.

B. All inspections and tests shall utilize the following references:

1. Project design specifications.
2. Project design drawings.
3. Project list of equipment to be inspected and tested.
4. Manufacturer's instruction manuals applicable to each particular equipment.

#### 1.4 QUALIFICATIONS OF TESTING FIRM

- A. The testing firm shall be an independent testing organization with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. The testing firm shall be regularly engaged in the testing of electrical equipment devices, installations, and systems, with at least five (5) years of documented experience.
- C. The lead, on-site, technical person shall be currently certified by the International Electrical Association (NETA), or National Institute for Certification in Engineering Technologies (NICET) in electrical power distribution system testing.
- D. The testing firm shall utilize engineers and technicians who are regularly employed by the firm for testing services.
- E. The testing firm shall submit proof of the above qualifications with bid documents when requested.
- F. The terms used herein, such as Testing Agency, Testing Contractor, Testing Laboratory, or Contractor Test Company, shall be construed to mean the testing firm.

#### 1.5 SUBMITTALS

- A. Provide submittals per Division 1, Section 013300, "Submittal Procedures".
- B. Qualifications of testing firm and personnel.
- C. Certified test reports.
- D. Two copies of blank forms for checklists, test reports, and other related forms for Engineer's review and approval.

#### 1.6 GENERAL REQUIREMENTS

- A. Routine insulation resistance, continuity, and rotation tests for all distribution and utilization equipment shall be performed prior to and in addition to acceptance tests specified herein.

- B. The Testing Firm shall notify the Engineer no fewer than 3 working days prior to commencement of any testing.
- C. Any system, material, or workmanship, which is found defective on the basis of Acceptance Tests shall be reported to the Engineer with recommendations for corrective action.
- D. The Testing Firm shall maintain a written record of all tests, and upon completion of project, shall assemble and certify a final test report.
- E. The final Test Report shall be submitted on conclusion of all required tests and corrective measures.

#### 1.7 SAFETY AND PRECAUTIONS

- A. Safety practices shall include, but will not be limited to, compliance with the following requirements:
  - 1. Occupational Safety and Health Act.
  - 2. Accident Prevention Manual for Industrial Operations, National Safety Council.
  - 3. Applicable State and Local safety operating procedures.
  - 4. Owners' Safety Practices.
  - 5. National Fire Protection Association – NFPA 70E.
  - 6. American National Standards for Personnel Protection.
- B. All tests shall be performed with apparatus de-energized. Exceptions must be thoroughly reviewed to identify safety hazards and adequate safeguards must be devised.
- C. The Testing Firm shall have a designated safety representative on the project site to supervise the testing operations with respect to safety.
- D. Test Report:
  - 1. The test report shall include the following:
    - a. Summary of Project.
    - b. List of testing equipment used.
    - c. Calibration date of testing equipment and due date of next calibration.
    - d. Ambient temperature and humidity at time of test.
    - e. Listing of equipment tested.
    - f. Test results.
    - g. Recommendations.
  - 2. Furnish original and four copies of the complete report to the Architect/District in accordance with requirements of Contract Documents.

#### 1.8 INSPECTION AND TEST PROCEDURES

- A. Contractor shall provide the Testing Firm, a copy of related contract documents such as drawings, specifications, engineer-reviewed submittals, coordination study report including all relay settings and other necessary information.
- B. Contractor shall supply a suitable source of power to each site and location per the testing firm requirements.

- C. Contractor shall notify the testing firm when equipment becomes available for acceptance tests. Work shall be coordinated to expedite project scheduling.
- D. Testing Firm shall review and evaluate all received documents and notify the Contractor and Engineer of any discrepancies in the documents and/or any other requirements immediately.
- E. Testing Firm shall provide and comply with the following:
  - 1. Acceptance test procedures for each individual equipment listed in Part 1 of this section for Engineer review and approval prior to any test and after thorough evaluation of the system. Testing shall conform to the International Electrical Testing Association (NETA) specifications and standards for electrical power distribution equipment and systems and manufacturer's instructions.
  - 2. Refer to each individual specification section for testing requirements and comply.
  - 3. Inspect installed equipment and report any discrepancy and/or deficiency with respect to the contract documents and governing codes prior to testing.

#### 1.9 SYSTEM FUNCTION TEST

- A. Perform system function test upon completion of equipment tests as defined in this section. It is the purpose of system function tests to verify proper interaction of all sensing, processing, and action devices.
- B. Implementation.
  - 1. Develop test parameters for the purpose of evaluation performance of all integral components and their functioning as a complete unit within design requirements.
  - 2. Test all interlocking devices.
  - 3. Record the operation of alarms and indicating devices.

#### 1.10 DEFICIENCIES

- A. All deficiencies reported by the Testing Firm shall be corrected by the Contractor and Acceptance and System Function Tests shall be repeated to verify conformance with requirements.

### **PART 2 - PRODUCTS**

- 2.1 Not applicable.

### **PART 3 - EXECUTION**

- 3.1 Not applicable.

**END OF SECTION**

## SECTION 26 2413 SWITCHBOARDS

### PART 1 – GENERAL

- 1.1 Furnish and install service entrance and distribution switchboards as herein specified and as shown on the drawings. In order to establish the minimum acceptable quality and type of equipment described in this section, the switchboard was technically and dimensionally designed around "Square D." If other acceptable manufacturer products listed in 2.1 are used, it shall be the responsibility of the Contractor to verify the equipment will meet the requirements of the design, both technically and dimensionally.
- 1.2 All electrical materials and equipment shall be new, and of the type and quality specified: Listed by Underwriters' Laboratories, and bear their label, where standards have been established; in compliance with the applicable standards of CEC (NFPA 70), NFPA, ANSI, IEEE, IPCEA and NEMA. All components and equipment enclosures shall be manufactured by the same manufacturer.
- 1.3 SUBMITTALS
  - 1.3.1 Submit shop drawings and manufacturers' data on the switchboard and components including:
    - 1.3.1.1 Equipment elevation diagrams indicating the bussing configurations and ampere ratings.
    - 1.3.1.2 Coordination study and incident energy level calculations.
    - 1.3.1.3 Metering equipment
    - 1.3.1.4 Breakers or fused switches
    - 1.3.1.5 Surge Protective Device (SPD)
- 1.4 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.4.1 Not including the Short Circuit and Coordination Study with the material submittals.
  - 1.4.2 Not including all items listed in the above itemized description.
  - 1.4.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.4.4 Not including actual manufacturer's catalog information of proposed products.
  - 1.4.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

### PART 2 – PRODUCTS

#### 2.1 MANUFACTURERS

- 2.1.1 Acceptable manufacturers are:
  - 2.1.1.1 Siemens
  - 2.1.1.2 Eaton
  - 2.1.1.3 Square D
  - 2.1.1.4 General Electric
- 2.2 Equipment manufactured by any other manufacturers not specifically listed in Section 2.1, are not considered equal or approved for use on this project.
- 2.3 Switchboards shall be of the dead front, safety type with voltage and ampere capacity as indicated. Provide a copper ground bus running the full length of the switchboards. The neutral bus shall be **100%** rated throughout.
- 2.4 Where conductor sizes exceed the standard breaker lug wire range, or where multiple conductors per phase are required, the manufacturer shall provide the breaker with suitable lugs for terminating the specified conductors.
- 2.5 All bussing shall be copper and braced for a short circuit current of 100,000 RMS symmetrical amperes minimum, or as noted on the drawings. Horizontal and vertical bussing shall be 100% fully rated; not tapered unless otherwise noted on the drawings. All sections shall have full height bus.
- 2.6 The main circuit breaker (480 volt or 208 volt, 800 amp or larger) shall be a stored energy solid state trip insulated case type breaker and shall consist of a three-pole electrically and mechanically trip-free circuit breaker with inter-pole barriers, arc quenchers, manual stored-energy closing mechanism, mechanical push-button trip, position indicator, and equipped for fixed mounting in the switchboard section. Main breaker shall be **100%** rated and shall be sized as indicated on the drawings. Minimum short circuit interrupting rating shall be 65,000 ampere symmetrical for all breakers in the main switchboard or as indicated on the drawings. For main breakers rated 2,500 amps and larger this rating shall be increased to 100,000 amps, or as indicated on the drawings.
  - 2.6.1 The over current trip devices to be furnished with the main circuit breaker shall be of the three-phase construction and employ solid-state components in their design to afford combinations of long, short time, and instantaneous and ground fault characteristics (480 volt only) as specified. The circuit breaker and integral solid-state trip device shall be self-contained to include necessary power supply, transformers and tapped current level sensing transformers. An external source shall not be required to trip the circuit breaker under fault of overload conditions or to test the ground fault trip.
  - 2.6.2 Field installed rating plug taps shall be provided.
  - 2.6.3 Main breakers 400 amp and larger shall be solid state trip.
  - 2.6.4 The main circuit breaker shall be provided with the following:
    - 2.6.4.1 Adjustable longtime delay element pickup.
    - 2.6.4.2 Adjustable short-time delay element pickup.

- 2.6.4.3 The instantaneous trip element pickup shall be adjustable from 1.5 to 10 times the sensor setting or none.
- 2.6.5 The feeder circuit breakers (480 volt or 208 volt, 400 amp or larger) shall be solid state trip molded case type breakers. They shall consist of a three-pole electrically and mechanically trip-free circuit breakers with inter-pole barriers, arc quenchers, manual closing mechanism, position indicator, and equipped for fixed mounting in the switchboard section. The breakers shall be a minimum of 80% rated, unless otherwise identified on the drawings and shall be sized as indicated on the drawings. Minimum short circuit interrupting rating shall be 65,000 ampere symmetrical or as indicated on the drawings.
  - 2.6.5.1 The overcurrent trip devices to be furnished with these circuit breakers shall be of the three-phase construction and employ solid-state components in their design to afford combinations of long, short time, and instantaneous and ground fault characteristics (480 volt only) as specified. The circuit breaker and integral solid-state trip device shall be self-contained to include necessary power supply, transformers and tapped current level sensing transformers. An external source shall not be required to trip the circuit breaker under fault of overload conditions or to test the ground fault trip.
  - 2.6.5.2 Field installed rating plug taps shall be provided as required.
  - 2.6.5.3 These circuit breakers shall be provided with the following:
    - 2.6.5.3.1 Adjustable long-time delay element pickup.
    - 2.6.5.3.2 Adjustable short-time delay element pickup.
    - 2.6.5.3.3 The instantaneous trip element pickup shall be adjustable from 1.5 to 10 times the sensor setting.
    - 2.6.5.3.4 Where the GFI function is required the settings shall be set at maximum levels.
- 2.7 Feeder breakers identified as 100% rating on the drawings may be molded case type below 1600 amp but 1600 amp and above shall be insulated case type. All breakers shall accept copper or aluminum conductors. Contractor must verify that the breaker can accept the possibility of aluminum conductors.
- 2.8 Circuit breakers less than 400 amps shall be molded case, trip free, quick-make, quick-break, thermal magnetic type, with handles clearly indicating rating and position-on, off, tripped.
- 2.9 Circuit breakers used in service entrance equipment, identified on the drawings shall have short circuit current ratings equal to the bracing and in no case smaller than 22,000 amperes RMS symmetrical.
- 2.10 The switchboard shall be manufactured to locate the utility company metering within the local utility company requirements, for maximum centerline height. This maximum height must include the 2-1/2" high (above finished grade) concrete housekeeping.

- 2.11 Provide a metal embossed nameplate adjacent to the switchboard rating, indicating the maximum short circuit current rating of the switchboard as determined by UL 891, September 30, 1982.
- 2.12 Where devices indicated are fusible type, fuses shall be Bussman or Littlefuse (no known equal).
- 2.13 Where a switchboard is indicated to be provided with an NEMA 3R (weatherproof) enclosure, the enclosure shall be manufactured to allow the equipment to mount flush against a vertical surface or wall. Rear roof equipment overhangs will not be permitted for weatherproof equipment.
- 2.14 Where auxiliary test kits or other devices are needed for setting breaker parameters they shall be supplied.

#### **Service Entrance – Surge Protective Device**

- 2.15 IEEE C62.41.1, IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits
- 2.16 IEEE C62.41.2, IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits
- 2.17 IEEE C62.45, IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits
- 2.18 National Electrical Code: Article 285
- 2.19 UL 1283 - Electromagnetic Interference Filters
- 2.20 SPD shall be UL 1449 labeled as Type 1 or Type 4 intended for Type 1 applications, verifiable at UL.com without need for external or supplemental over current controls. Every suppression component of every mode, including N-G, shall be protected by internal over current and thermal over temperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of the specification
- 2.21 SPD shall be factory installed integral to electrical distribution equipment
- 2.22 SPD shall be UL labeled with 20kA I-nominal (I-n)
- 2.23 SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR)
- 2.24 Standard Mode Protection paths: SPD shall provide surge current paths for all modes of protection: L-N, L-G, L-L, and N-G for Wye systems.
- 2.25 SPD shall be connected to the buss of the distribution equipment with an appropriately sized 200kA SCCR rated disconnect
- 2.26 SPD shall meet or exceed the following criteria:
  - 2.26.1 MAXIMUM 7-Mode surge current capability per phase shall be 400kA for mountain and desert areas with over 5 lightning strikes per year.
  - 2.26.2 UL 1449 – Third Edition Revisions; effective September 29, 2009 Voltage Protection Ratings shall not exceed the following:

| <u>VOLTAGE</u> | <u>L-N</u> | <u>L-G</u> | <u>N-G</u> | <u>L-L</u> | <u>MCOV</u> |
|----------------|------------|------------|------------|------------|-------------|
| 208Y/120       | 700V       | 700V       | 700V       | 1200V      | 150V        |
| 480Y/277       | 1200V      | 1200V      | 1200V      | 2000V      | 320V        |

2.26.3 UL 1449 Listed Maximum Continuous Operating Voltage (MCOV) (verifiable at UL.com)

| <u>System Voltage</u> | <u>Allowable System Voltage Fluctuation (%)</u> | <u>MCOV</u> |
|-----------------------|-------------------------------------------------|-------------|
| 208Y/120              | 25%                                             | 150V        |
| 480Y/277              | 15%                                             | 320V        |

2.27 SPD shall incorporate a UL 1283 listed EMI/RFI filter with minimum attenuation of -50dB at 100 kHz

2.28 Suppression components shall be heavy duty 'large block' MOVs, each exceeding 30mm diameter.

2.29 SPD shall include a serviceable, replaceable module.

2.30 SPD shall be equipped with the following diagnostics:

2.30.1 Visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service Led

2.30.2 Audible alarm with on/off silence function and diagnostic test function (excluding branch)

2.30.3 Form C dry Contacts

No other test equipment shall be required for SPD monitoring or testing before or after installation.

2.30.4 SPD shall have a 10 year warranty

### Short-Circuit and Coordination Studies

2.31 The contractor shall provide the following studies; a time current and complete short-circuit study, equipment-interrupting or withstand evaluation, and a protective-device coordination study as described below for the distribution system. The equipment study shall be included with the equipment submittals. The studies shall include all portions of the electrical distribution system from the normal and alternate sources of power throughout the low-voltage distribution system. Normal system operating method, alternate operation, and operations which could result in maximum-fault conditions shall be thoroughly covered in the study. The studies are to be reviewed by a Professional Engineer registered in the State of California.

2.31.1 **All studies shall be performed by "Emerson Electric" (858) 695-9551, MTA (858) 472-0193, or Terra Power Solutions (858) 380-8170. Studies performed by manufactures or other engineering or testing companies must submit qualifications for approval by Johnson Consulting Engineers, 7 days prior to bid for this project.**

2.32 Short-Circuit Study

2.32.1 The study shall be in accordance with applicable ANSI and IEEE standards.

- 2.32.2 The study input data shall include the short-circuit single- and three-phase contributions from all sources, with the X/R ratio, the resistance and reactance components of each branch impedance, motor and generator contributions, base quantities selected, and all other applicable circuit parameters.
- 2.32.3 Short-circuit momentary duties and interrupting duties shall be calculated on the basis of maximum available fault current at each switchgear bus, switchboard, motor control center, distribution panelboard, pertinent branch circuit panelboards, and other significant locations through the system.
- 2.32.4 For the portions of a system utilizing medium- and high-voltage breakers, separate calculations shall be made for one-half cycle (close and latch) currents and interrupting currents. Calculations shall be for three-phase and phase-to-ground faults at each bus under consideration.
- 2.32.5 For the portions of a system utilizing low-voltage breakers (less than 1,000 volts), calculations shall be made for three-phase and phase-to-ground interrupting currents at each bus under consideration.
- 2.33 Equipment Evaluation Study
  - 2.33.1 An equipment evaluation study shall be performed to assure the adequacy of circuit breakers, controllers, surge arresters, busways, switches, and fuses by tabulating and comparing the short-circuit ratings of these devices with the maximum short-circuit momentary and interrupting duties. Series rating of over current protective devices shall be permitted to reduce the maximum available short circuit current to panelboard branch circuit breakers to no more than 10,000 amps symmetrical for the 120/208 volt system and 14,000 amps symmetrical for the 277/480 volt system.
- 2.34 Protective-Device Coordination Study
  - 2.34.1 A protective-device coordination study shall be performed to select or to verify the selection of power fuse ratings, protective-relay characteristics and settings, ratios, and characteristics of associated voltage and current transformers, and low-voltage breaker trip characteristics and settings. Time current curves are to be colored to clearly indicate coordination.
  - 2.34.2 The coordination study shall include all voltage classes of equipment from the source's incoming line protective device down to and including each motor control center and/or panelboard. The phase and ground over current protection shall be included as well as settings for all other adjustable protective devices. Ground fault settings are to, as a minimum coordinate with a downstream 50 amp branch circuit breaker.
  - 2.34.3 Protective device selection and settings shall be in accordance with requirements of the National Electrical Code and the recommendations of the ANSI/IEEE Standard 399, as applicable.
- 2.35 Study Report
  - 2.35.1 The results of the power-system studies shall be summarized in a final report. The report shall include the following sections:

- 2.35.1.1 Description, purpose, basis, and scope of the study and a single-line diagram of the portion of the power system which is included within the scope of study.
- 2.35.1.2 Tabulations of circuit breaker, fuse, and other equipment ratings versus calculated short-circuit duties and commentary regarding same.
- 2.35.1.3 Protective device coordination curves, with commentary.
- 2.35.1.4 The selection and settings of the protective devices shall be provided separately in a tabulated form listing circuit identification, IEEE device number, current transformer ratios, manufacturer, type, range of adjustment, and recommended settings. A tabulation of the recommended power fuse selection shall be provided for all fuses in the system.
- 2.35.1.5 Fault-current tabulations including a definition of terms and a guide for interpretation.
- 2.35.1.6 The report must be submitted with the material submittal for the engineers approval.

#### 2.36 Implementation

- 2.36.1 The contractor shall be responsible for providing over current devices which are in compliance with the results of the above study.

### **PART 3 – EXECUTION**

- 3.1 Switchboard shall be provided with adequate lifting means and capable of being rolled or moved directly to the floor without the use of floor sills.
- 3.2 Switchboard installation shall be done in accordance with National Electrical Installation Standards (NECA 400-1998) for installing and maintaining switchboards.
- 3.3 Provide 2-1/2" concrete housekeeping pads for service entrance and distribution switchboards. For switchboards containing local utility company metering equipment, the concrete pad must be flush with the front edge of the switchboard enclosure.
- 3.4 Provide permanently affixed engraved nameplate stating UL listed fault current rating of switchboard assembly. Locate adjacent to the equipment nameplate on front of switchboard.
- 3.5 All lugs shall be torque tested in the presence of the inspector of record.
- 3.6 Arc Flash and Shock Hazard
  - 3.6.1 The Contractor is to provide, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in NFPA 70E or IEEE standard 1584-2002.
  - 3.6.2 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E,

section 110.16. Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high. The label is not to identify the party performing the study but only the technical information needed.

- 3.6.3 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department.
- 3.6.4 The design goal is to minimize the incident energy to which a maintenance employee may be exposed.

**END OF SECTION**

**SECTION 26 2416**  
**PANEL BOARDS**

**PART 1 – GENERAL**

- 1.1 Furnish and install branch circuit panel boards as specified herein and as indicated on the drawings. Submit manufacturers' data on all items.
- 1.2 Submit manufacturers' data on all panel boards and components including:
  - 1.2.1 Enclosures and covers
  - 1.2.2 Breakers
  - 1.2.3 Surge Protective Device (SPD) equipment
  - 1.2.4 Incident energy level calculations
  - 1.2.5 Common submittal mistakes which will result in the submittals being rejected:
    - 1.2.5.1 Not arranging the circuit breakers in panels to match the orientations indicated on the drawings. In other words, if a 30 amp breaker is shown on the drawing in Space #2, this must be the location it appears on the submittal schedule. Standard factory arrangements will not be accepted.
    - 1.2.5.2 Not including all items listed in the above itemized description.
    - 1.2.5.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
    - 1.2.5.4 Not including actual manufacturer's catalog information of proposed products.
    - 1.2.5.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements or "to be determined later" statements. The products being submitted must be the products installed.

**PART 2 – PRODUCTS**

- 2.1 The interrupting rating of circuit breakers shall be 10,000 amps for the 120/208 system and 14,000 amp for 277/480 volt systems. Refer to drawings for higher interrupting rating requirements. All components and equipment enclosures shall be manufactured by the same manufacturer. Circuit breakers shall be permitted to be series rated to limit the available fault current to no more than the above ratings.
- 2.2 All panels shall be fully bussed. Recessed panel enclosures shall be a maximum of 20" wide and 5-3/4" deep for all panels 600 amp rated and less.
- 2.3 All busses shall be copper and shall be located in the rear of the panelboard cabinet. Individual circuit breakers shall be bolt on type and removable from the cabinet without disturbing the bussing in any way. All panel boards shall contain ground busses.

- 2.4 Panel covers shall be door in door style, with one lock. Door lock shall allow access to breakers only. Access to wireways without removal of cover shall be permitted by (non removable) screws behind the locked door. Panel cover shall be provided with full length piano hinge. All locks for all panels provided in this project shall be keyed alike.
- 2.5 Each panel shall have a two-column circuit index card set under glass or glass equivalent on the inside of the door. Each circuit shall be identified as to use and room or area. Areas shall be designated by room numbers. Room numbers shown on the drawings may change and contractor shall verify final room numbers with the architect prior to project completion.
- 2.6 Tandem mounted or wafer type breakers are not acceptable.
- 2.7 Multiple breakers shall have one common trip handle or be internally connected. Handle ties are not acceptable.
- 2.8 Breaker arrangements shown in the drawings shall be maintained. The circuit breakers in panels must match the orientations indicated on the drawings. In other words, if a 30 amp breaker is shown on the drawing in Space #2, this must be the location it appears on the submittal schedule. Standard factory arrangements will not be accepted.
- 2.9 Where conductor sizes exceed the standard breaker lug wire range, or where multiple conductors per phase are required, the panelboard manufacturer shall provide the breaker with suitable lugs for terminating the specified conductors.
- 2.10 Acceptable manufacturers are Eaton, Siemens or General Electric.
- 2.11 Equipment manufactured by any other manufacturers not specifically listed in Section 2.10 are not considered equal, or approved for use on this project.

#### **Surge Protective Device (SPD)**

- 2.12 Surge Protective Device (SPD) panelboards, shall be provided with an integrated circuit breaker panelboard and parallel connected suppression / filter system in a single enclosure. The SPD panelboard shall meet the following parameters: IEEE C62.41.1, IEEE C62.41.2, IEEE C62.45, UL 1283 and the UL 1449, Third Edition, effective September 29, 2009.
- 2.13 The panelboard shall be UL 67 Listed and the SPD shall be UL 1449 labeled as Type 1 or Type 2 or as Type 4 intended for Type 1 or Type 2 applications. SPD shall be factory installed integral to the panel board.
- 2.14 The SPD panelboard shall be top or bottom feed according to requirements. A circuit directory shall be located inside the door.
- 2.15 SPD shall meet or exceed the following criteria:
  - 2.15.1 For standard areas supply SPD having 100kA per phase surge current capacity. For mountain and desert areas (areas with over 5 lightning strikes per year), SPD shall have a per phase surge current capacity of 200kA.
  - 2.15.2 UL 1449 – Third Edition Revision; effective September 29, 2009, Voltage Protection Ratings shall not exceed the following:

| <u>VOLTAGE</u> | <u>L-N</u> | <u>L-G</u> | <u>N-G</u> | <u>L-L</u> | <u>MCOV</u> |
|----------------|------------|------------|------------|------------|-------------|
| 208Y/120       | 700V       | 700V       | 700V       | 1200V      | 150V        |
| 480Y/277       | 1200V      | 1200V      | 1200V      | 2000V      | 320V        |

2.15.3 SPD shall be UL labeled with 100kA Short Circuit Current Rating (SCCR).

- 2.16 UL 1449 - Third Edition Revision; effective September 29, 2009, Voltage Protection Ratings shall not exceed the following:

| <u>VOLTAGE</u> | <u>L-N</u> | <u>L-G</u> | <u>N-G</u> | <u>L-L</u> | <u>MCOV</u> |
|----------------|------------|------------|------------|------------|-------------|
| 208Y/120       | 700V       | 700V       | 700V       | 1200V      | 150V        |
| 480Y/277       | 1200V      | 1200V      | 1200V      | 2000V      | 320V        |

- 2.17 SPD shall be UL labeled with a minimum 100kVA short circuit rated (SCCR).

- 2.18 UL 1449 Listed Maximum Continuous Operating Voltage (MCOV) (verifiable at UL.com):

| <u>System Voltage</u> | <u>Allowable System Voltage Fluctuation (%)</u> | <u>MCOV</u> |
|-----------------------|-------------------------------------------------|-------------|
| 208Y/120              | 25%                                             | 150V        |
| 480Y/277              | 15%                                             | 320V        |

- 2.19 SPD shall incorporate a UL 1283 listed EMI/RFI filter with minimum attenuation of - 50dB at 100 kHz. No filtering is required for a 100kA SPD.

- 2.20 Suppression components shall be heavy duty 'large block' MOVs, each exceeding 30mm diameter.

- 2.21 Type 4 SPD shall include a serviceable, replaceable module.

- 2.22 SPD shall be equipped with the following diagnostics:

2.22.1 Visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service LED.

2.22.2 No other test equipment shall be required for SPD monitoring or testing before or after installation.

- 2.23 SPD shall have a response time no greater than 1/2 nanosecond

- 2.24 SPD shall have a 10 year warranty

- 2.25 The SPD panelboard shall have removable interior

- 2.26 The SPD panelboard main bus shall be aluminum and rated for the load current required

- 2.27 The SPD panelboard shall include a 200% rated neutral assembly with copper neutral bus

- 2.28 The unit shall be provided with a safety ground bus

### **(SPD) Quality Assurance**

- 2.29 Manufacturer Qualifications: Engage a firm with at least 5 years experience in manufacturing transient voltage surge suppressors.

- 2.30 Manufacturer shall be ISO 9001 or 9002 certified.
- 2.31 The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- 2.32 The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

### **PART 3 – EXECUTION**

- 3.1 Painting of panelboard covers in finished areas shall be done by the general contractor.
- 3.2 Provide a spare 3/4" conduit stubbed to an accessible area for each of every three (3) spares or spaces provided in recessed panel boards.
- 3.3 All lugs shall be torque tested in the presence of the inspector of record.

#### **Short Circuit & Coordination Study**

- 3.4 The contractor shall provide the following studies; a time current and complete short-circuit study, equipment-interrupting or withstand evaluation, and a protective-device coordination study as described below for the distribution system. The equipment study shall be included with the equipment submittals. The studies shall include all portions of the electrical distribution system from the normal and alternate sources of power throughout the low-voltage distribution system. Normal system operating method, alternate operation, and operations which could result in maximum-fault conditions shall be thoroughly covered in the study. The studies are to be reviewed by a Professional Engineer registered in the State of California.

- 3.4.1 **All studies shall be performed by “Emerson Electric” (858) 695-9551, MTA (858) 472-0193, or Terra Power Solutions (858) 380-8170. Studies performed by manufactures or other engineering or testing companies must submit qualifications for approval by Johnson Consulting Engineers, 7 days prior to bid for this project.**

#### **3.5 Short-Circuit Study**

- 3.5.1 The study shall be in accordance with applicable ANSI and IEEE standards.
  - 3.5.2 The study input data shall include the short-circuit single- and three-phase contributions from all sources, with the X/R ratio, the resistance and reactance components of each branch impedance, motor and generator contributions, base quantities selected, and all other applicable circuit parameters.
  - 3.5.3 Short-circuit momentary duties and interrupting duties shall be calculated on the basis of maximum available fault current at each switchgear bus, switchboard, motor control center, distribution panelboard, pertinent branch circuit panelboards, and other significant locations through the system.
  - 3.5.4 For the portions of a system utilizing medium- and high-voltage breakers, separate calculations shall be made for one-half cycle (close and latch) currents and interrupting currents. Calculations shall be for three-phase and phase-to-ground faults at each bus under consideration.

- 3.5.5 For the portions of a system utilizing low-voltage breakers (less than 1,000 volts), calculations shall be made for three-phase and phase-to-ground interrupting currents at each bus under consideration.

### 3.6 Equipment Evaluation Study

- 3.6.1 An equipment evaluation study shall be performed to assure the adequacy of circuit breakers, controllers, surge arresters, busways, switches, and fuses by tabulating and comparing the short-circuit ratings of these devices with the maximum short-circuit momentary and interrupting duties. Series rating of over current protective devices shall be permitted to reduce the maximum available short circuit current to panelboard branch circuit breakers to no more than 10,000 amps symmetrical for the 120/208 volt system and 14,000 amps symmetrical for the 277/480 volt system.

### 3.7 Protective-Device Coordination Study

- 3.7.1 A protective-device coordination study shall be performed to select or to verify the selection of power fuse ratings, protective-relay characteristics and settings, ratios, and characteristics of associated voltage and current transformers, and low-voltage breaker trip characteristics and settings. Time current curves are to be colored to clearly indicate coordination.
- 3.7.2 The coordination study shall include all voltage classes of equipment from the source's incoming line protective device down to and including each motor control center and/or panelboard. The phase and ground over current protection shall be included as well as settings for all other adjustable protective devices. Ground fault settings are to, as a minimum coordinate with a downstream 50 amp branch circuit breaker.
- 3.7.3 Protective device selection and settings shall be in accordance with requirements of the National Electrical Code and the recommendations of the ANSI/IEEE Standard 399, as applicable.

### Arc Flash and Shock Hazard

- 3.8 The Contractor is to provide, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in NFPA 70E or IEEE standard 1584-2002.

### 3.9 Study Report

- 3.9.1 The results of the power-system studies shall be summarized in a final report. The report shall include the following sections:
  - 3.9.1.1 Description, purpose, basis, and scope of the study and a single-line diagram of the portion of the power system which is included within the scope of study.
  - 3.9.1.2 Tabulations of circuit breaker, fuse, and other equipment ratings versus calculated short-circuit duties and commentary regarding same.
  - 3.9.1.3 Protective device coordination curves, with commentary.

- 3.9.1.4 The selection and settings of the protective devices shall be provided separately in a tabulated form listing circuit identification, IEEE device number, current transformer ratios, manufacturer, type, range of adjustment, and recommended settings. A tabulation of the recommended power fuse selection shall be provided for all fuses in the system.
  - 3.9.1.5 Fault-current tabulations including a definition of terms and a guide for interpretation.
  - 3.9.1.6 The report must be submitted with the material submittal for the engineer's approval.
- 3.10 Implementation
  - 3.10.1 The contractor is to be responsible for providing over current devices which are in compliance with the results of the above study.
- 3.11 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E, section 110.16. Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.
- 3.12 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department.
- 3.13 The design goal is to minimize the incident energy to which a maintenance employee may be exposed.

**END OF SECTION**

**SECTION 26 9090**  
**ELECTRICAL CLOSEOUT**

**PART 1 – GENERAL**

- 1.1 Upon completion of the electrical work, the entire installation shall be tested by the Contractor, and demonstrated to be operating satisfactorily to the Architect, Engineer, Inspector and Owner.
- 1.2 All testing and corrections shall be made prior to demonstration of operation to the Architect, Engineer, Inspector and Owner.
- 1.3 In addition to the demonstration of operation, the Contractor is also required to review the content and quality of instructions provided on items demonstrated with the Architect, Engineer, Inspector and Owner.

**PART 2 – EXECUTION**

- 2.1 Wiring shall be tested for continuity, short circuits and/or accidental grounds. All systems shall be entirely free from "grounds," "short circuits," and any or all defects.
- 2.2 Motors shall be operating in proper rotations, and control devices functioning properly. Check all motor controllers to determine that properly sized overload devices are installed, and all other electrical equipment for proper operation.
- 2.3 Tests and adjustments shall be made prior to acceptance of the electrical installation by the Architect, and a certificate of inspection and acceptance of the electrical installation by local inspection authorities shall be provided.
- 2.4 All equipment or wiring provided which tests prove to be defective or operating improperly shall be corrected or replaced promptly, at no additional cost to the Owner.
- 2.5 Test all motor and feeder circuits with a "megger" tester to determine that insulation values conform to Section 110-20, California Electrical Code (CED). Test reports must be submitted and approved by the engineer before final acceptance.
- 2.6 Test all grounding electrode connections to assure a resistance of no more than 10 ohms is achieved. Augment grounding until the ohmic value stated above is achieved. Provide certified test results to the Architect, Engineer and Inspector.

**END OF SECTION**

## **SECTION 31 2316.13 TRENCHING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Backfilling and compacting for utilities outside the building .

#### **1.02 REFERENCE STANDARDS**

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2015.
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012.
- C. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2015.
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)); 2012.
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.
- F. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

#### **1.03 DEFINITIONS**

- A. Finish Grade Elevations: Indicated on drawings.
- B. Subgrade Elevations: 30 inches (\_\_\_\_ mm) below finish grade elevations indicated on drawings to the top of the utility, unless otherwise indicated.

#### **1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- C. Compaction Density Test Reports.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. Verify that survey bench marks and intended elevations for the Work are as indicated.
- C. Protect plants, lawns, rock outcroppings, and other features to remain.
- D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

### **PART 2 PRODUCTS**

#### **2.01 FILL MATERIALS**

- A. General Fill - Fill Type \_\_\_\_: Conforming to State of California Public Works Department standard.
- B. Granular Fill - Fill Type \_\_\_\_: Coarse aggregate, conforming to State of California Public Works Department standard.
- C. Sand: Conforming to State of California Public Works Department standard.

#### **2.02 PLASTIC WARNING TAPE**

- A. Acid and alkali-resistant polyethylene film specifically manufactured for marking and identifying underground utilities.
  - 1. Minimum width, 6 inches; minimum thickness, 4 mils.

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| Electric Upgrades at Vista Academy | 31 2316.13 - 1 | Trenching |
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2. Metallic core encased in protective jacket resistant to corrosion and detectable by metal detector when tape is buried 3-feet deep.
- B. Continuous printed inscription shall describe utility. Tape color:
1. Electric: Red.
  2. Gas: Yellow.
  3. Telephone: Orange.
  4. CATV: Orange.
  5. Water System: Blue.
  6. Sewer: Green.

### **2.03 SOURCE QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that survey bench marks and intended elevations for the work are as indicated.

### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 2200 for additional requirements.
- C. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Architect.

### **3.03 TRENCHING**

- A. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Cut trenches wide enough to allow inspection of installed utilities.
- E. Hand trim excavations. Remove loose matter.
- F. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
- G. Remove excavated material that is unsuitable for re-use from site.
- H. Remove excess excavated material from site.
- I. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.
- J. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot (305 mm) into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect.

### **3.04 PREPARATION FOR UTILITY PLACEMENT**

- A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

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| Electric Upgrades at Vista Academy | 31 2316.13 - 2 | Trenching |
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- C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

### **3.05 BACKFILLING**

- A. Backfill and compact in 8" maximum lifts to contours and elevations indicated using specified materials.
- B. Fill up to subgrade elevations unless otherwise indicated.
- C. Employ a placement method that does not disturb or damage other work.
- D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Correct areas that are over-excavated.
  - 1. Thrust bearing surfaces: Fill with concrete.
  - 2. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.
- G. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under paving and similar construction: 95 percent of maximum dry density.

### **3.06 BEDDING AND FILL AT SPECIFIC LOCATIONS**

- A. Utility Piping, Conduits, and Duct Bank:
  - 1. Bedding: Use Fill Type sand gravel crushed aggregate or native free draining granular material having sand equivalent of not less than 50 and expansion coefficient of not more than .5 of 1%.
  - 2. Cover with general fill.
  - 3. Compact in maximum 8 inch (200 mm) lifts to 95 percent of maximum dry density.

### **3.07 TOLERANCES**

- A. Top Surface of General Backfilling: Plus or minus 1 inch (25 mm) from required elevations.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch (25 mm) from required elevations.

### **3.08 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), AASHTO T 180, or ASTM D698 ("standard Proctor").
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

### **3.09 CLEANING**

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

**SECTION 31 2323  
FILL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Filling, backfilling, and compacting for building volume below grade, footings, pile caps, slabs-on-grade, paving, and utilities within the building.
- B. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

**1.02 RELATED REQUIREMENTS**

- A. Section 31 2200 - Grading: Removal and handling of soil to be re-used.
- B. Section 31 2200 - Grading: Site grading.
- C. Section 31 2316 - Excavation: Removal and handling of soil to be re-used.
- D. Section 31 2316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

**1.03 REFERENCE STANDARDS**

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2015.
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012.
- C. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2015.
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)); 2012.
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.
- G. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

**1.04 DEFINITIONS**

- A. Finish Grade Elevations: Indicated on drawings.
- B. Subgrade Elevations: As indicated on drawings and/or as determined by paving or slab sections.

**1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.
- C. Compaction Density Test Reports.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need as indicated in Contractor's approved logistics plan.
- B. When fill materials need to be stored on site, locate stockpiles where indicated.
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.
- C. Verify that survey bench marks and intended elevations for the Work are as indicated.

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| Electric Upgrades at Vista Academy | 31 2323 - 1 | Fill |
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## **PART 2 PRODUCTS**

### **2.01 FILL MATERIALS**

- A. General Fill: Subsoil excavated on-site.
  - 1. Graded.
  - 2. Clean deposits free of roots, stumps, vegetation, deleterious matter, trash, debris, and unsuitable materials as approved in the field by the project geotechnical consultant.
- B. Concrete for Fill: Lean concrete.
- C. Granular Fill - Fill Type \_\_\_\_: Coarse aggregate, conforming to State of California Public Works Department standard.
- D. Topsoil - Fill Type \_\_\_\_: Topsoil excavated on-site, or imported.
  - 1. Graded.
  - 2. Free of roots, rocks larger than 1 inch (\_\_\_\_ mm), subsoil, debris, large weeds and foreign matter.
- E. Bedding Material: Bedding material shall be sand, gravel, crushed aggregate or approved native material. Bedding material shall have a sand equivalent of not less than 30 or have a coefficient of permeability greater than 0.001 centimeters per second. Bedding material shall be sized within the following range:
  - 1. 3/4" Sieve: 100 percent passing.
  - 2. No. 4 Sieve: 35 to 65 percent passing.
  - 3. No. 200 Sieve: 0 to 10 percent passing.

### **2.02 ACCESSORIES**

### **2.03 SOURCE QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 2200 for additional requirements.
- C. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
- D. Verify areas to be filled are not compromised with surface or ground water.

### **3.02 PREPARATION**

- A. Scarify and proof roll subgrade surface to a depth of 6 inches (150 mm) to identify soft spots.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

### **3.03 FILLING**

- A. Fill to contours and elevations indicated using specified materials.
- B. Fill up to subgrade elevations unless otherwise indicated.
- C. Employ a placement method that does not disturb or damage other work.
- D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.

- F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches (150 mm) compacted depth.
- G. Slope grade away from building minimum 2 inches in 10 feet (50 mm in 3 m), unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- H. Correct areas that are over-excavated.
  - 1. Load-bearing foundation surfaces: Fill with concrete.
  - 2. Other areas: Use general fill, flush to required elevation, compacted to minimum 90 percent of maximum dry density.
- I. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under paving, slabs-on-grade, and similar construction: 90 percent of maximum dry density.
  - 2. At other locations: 90 percent of maximum dry density.
- J. Reshape and re-compact fills subjected to vehicular traffic.
- K. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

### **3.04 FILL AT SPECIFIC LOCATIONS**

- A. At Foundation Walls and Footings:
  - 1. Use general fill.
  - 2. Fill up to subgrade elevation.
  - 3. Compact each lift to 95 percent of maximum dry density.
  - 4. Do not backfill against unsupported foundation walls.
- B. Over Buried Utility Piping, Conduits, and Duct Bank in Trenches:
  - 1. Bedding: Use sand or granular fill.
  - 2. Cover with general fill.
  - 3. Compact in maximum 8 inch (200 mm) lifts to 95 percent of maximum dry density.

### **3.05 TOLERANCES**

- A. Top Surface of General Filling: Plus or minus 1 inch (25 mm) from required elevations.
- B. Top Surface of Filling Under Paved Areas: Plus or minus 1/2 inch (12.5 mm) from required elevations.

### **3.06 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, ASTM D 1557 ("modified Proctor"), ASTM D 698 ("standard Proctor"), AASHTO T 180, ASTM D 1557 ("modified Proctor"), ASTM D 698 ("standard Proctor"), AASHTO T 180, ASTM D 1557 ("modified Proctor"), or ASTM D 698 ("standard Proctor").
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

### **3.07 CLEANING**

- A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

**SECTION 32 1123  
AGGREGATE BASE COURSES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Aggregate base course.

**1.02 RELATED REQUIREMENTS**

- A. Section 31 2200 - Grading: Preparation of site for base course.
- B. Section 31 2316.13 - Trenching: Compacted fill over utility trenches under base course.
- C. Section 31 2323 - Fill: Compacted fill under base course.
- D. Section 32 1216 - Asphalt Paving: Finish and binder asphalt courses.
- E. Section 32 1313 - Concrete Paving: Finish concrete surface course.

**1.03 REFERENCE STANDARDS**

- A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; 1965 (2012).
- B. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2015.
- C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012.
- D. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2015.
- E. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)); 2012.
- F. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.
- G. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.
- H. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2015.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Materials Sources: Submit name of imported materials source.
- C. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- D. Compaction Density Test Reports.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. Aggregate Storage, General:
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.
- C. Verify that survey bench marks and intended elevations for the Work are as indicated.

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| Electric Upgrades at Vista Academy | 32 1123 - 1 | Aggregate Base Courses |
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## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Coarse Aggregate Type Class II Road Base: Coarse aggregate, conforming to State of California Public Works Department standard.
- B. Fine Aggregate: Sand; conforming to State of California Public Works Department standard.
- C. Herbicide: Dupont Oust XP or equal. Herbicide must conform to California EPA requirements.

### **2.02 SOURCE QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.
- B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

### **3.02 PREPARATION**

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place aggregate on soft, muddy, or frozen surfaces.

### **3.03 INSTALLATION**

- A. Under Bituminous Concrete Paving:
  - 1. Place coarse aggregate to a total compacted thickness as indicated on drawings.
  - 2. Compact to 95 percent of maximum dry density.
- B. Place aggregate in maximum 4 inch (100 mm) layers and roller compact to specified density.
- C. Level and contour surfaces to elevations and gradients indicated.
- D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.
- F. Apply herbicide to finished surface.

### **3.04 TOLERANCES**

- A. Flatness: Maximum variation of 1/4 inch (6.4 mm) measured with 10 foot (3 m) straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch (6.4 mm).

### **3.05 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
- C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, ASTM D698 ("standard Proctor"), or ASTM D1557 ("modified Proctor").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

### 3.06 CLEANING

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

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| Electric Upgrades at Vista Academy | 32 1123 - 3 | Aggregate Base Courses |
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**SECTION 32 1216  
ASPHALT PAVING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Aggregate Base Course.
- B. Asphalt Concrete Paving.
- C. Herbicide Treatment.
- D. Pavement-marking paint.
- E. Redwood Headers.
- F. Surface Sealer.
- G. Slurry Seal Coat.
- H. Asphalt Grind and Overlay.

**1.02 RELATED REQUIREMENTS**

- A. Section 31 2200 - Grading: Preparation of site for paving and base.
- B. Section 31 2323 - Fill: Compacted subgrade for paving.
- C. Section 32 1123 - Aggregate Base Courses: Aggregate base course.

**1.03 REFERENCE STANDARDS**

- A. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; 1997.
- B. AI MS-19 - A Basic Asphalt Emulsion Manual; Fourth Edition.
- C. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction; 2009a.
- D. Standard Specifications for Public Works Construction ("Greenbook") - 1997 Edition.
- E. Standard Specifications, State of California, Department of Transportation (Caltrans).

**1.04 SUBMITTALS**

- A. Mix Design:
  - 1. Submit for approval each job-mix formula proposed for work of this section.
- B. Approved Mix:
  - 1. Furnish licensed weighmaster certificates with each load of asphalt concrete delivered to project. Yield of asphalt concrete material shall be twenty four (24) pounds per square foot of paving area based on two inch thickness after rolling. A five (5) percent tolerance will be allowed between total calculated weight and actual weight incorporated in the work.

**1.05 QUALITY ASSURANCE**

- A. Perform Work in accordance with State of California Public Work's standard.
  - 1. Provide aggregate base asphalt concrete and installation complying with Standard Specifications for Public Works Construction (PWC Specifications), current edition, and the Regional Supplement Amendments to the Standard Specifications for Public Works Construction, current edition, and as herein specified.
- B. Mixing Plant: Conform to State of California Public Work's standard.
- C. Obtain materials from same source throughout.
- D. Installer's Qualifications: Firm specializing in paving installation, with not less than 5 years of experience in installation of paving similar to that required for this project.
- E. Testing and Inspection:
  - 1. The owner will engage an independent testing and inspection agency to perform quality control procedures and to prepare test reports.

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| Electric Upgrades at Vista Academy | 32 1216 - 1 | Asphalt Paving |
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## **1.06 REGULATORY REQUIREMENTS**

- A. Conform to applicable code for paving work on public property.

## **1.07 FIELD CONDITIONS**

- A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F (4 degrees C), or surface is wet or frozen.
- B. Place bitumen mixture when temperature is not more than 15 F degrees (8 C degrees) below bitumen supplier's bill of lading and not more than maximum specified temperature.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Asphalt Cement: ASTM D 946.
- B. Aggregate for Binder Course: In accordance with State of California Public Work's standards.
- C. Aggregate for Wearing Course: In accordance with State of California Public Work's standards.
- D. Fine Aggregate: In accordance with State of California Public Work's standards.
- E. Mineral Filler: Finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter.
- F. Seal Coat:
  - 1. Parking area, driveways, asphalt walks and ramps: Fog seal of slow breaking asphalt emulsion, grade SS-1H per PWC Specifications 203-3.
- G. Herbicide: United States EPA-registered chemical herbicide suitable for application indicated.
  - 1. Manufacturer: Provide products complying with requirements of the contract documents and made by one of the following:
    - a. Ciba-Geigy Corporation.
    - b. DowElanco.
    - c. E. I. du Pont de Nemours and Company, Inc.
- H. Pavement-Marking Paint: Chlorinated rubber-alkyd paint (FS TT-P-115, Type III); factory-mixed, quick-drying, and non-bleeding.
- I. Wood Headers, Stakes, Benders and Splices: "Foundation" grade redwood as graded by Redwood Inspection Service. Minimum 2" thick lumber for headers and stakes and minimum 1" thick boards for splices. Use galvanized nails for fastening.
- J. Asphalt Grind and Overlay: Located as indicated on drawings.

### **2.02 ASPHALT PAVING MIXES AND MIX DESIGN**

- A. Base Course: State of California Public Work's standards.
- B. Binder Course: State of California Public Work's standards.
- C. Wearing Course: State of California Public Work's standards.
- D. Submit proposed mix design of each class of mix for review prior to beginning of work.
- E. Asphalt Concrete:
  - 1. Paving section shall be minimum 3" asphalt paving (rolled thickness) over 9" class two base over 95% compacted subgrade unless noted otherwise on drawings.

### **2.03 SOURCE QUALITY CONTROL**

- A. Test mix design and samples in accordance with AI MS-2.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Comply with cross sections, elevations, and grades indicated on the drawings.
- B. Prepare and install pavement structures in accordance with practices recommended in the "Asphalt Paving Manual"; Publication MS-8; Asphalt Institute, except to the extent that such

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practices are superseded by specific requirements of this section.

### 3.02 EXAMINATION

- A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.
- C. Notify architect in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily corrected.
- D. Commencement of paving work shall constitute acceptance of subbase conditions.

### 3.03 PREPARATION

- A. General: Immediately before placing asphalt concrete mix, remove all loose or deleterious material from surface over which pavement will be placed. Ensure that subbase is properly prepared to receive paving.
  - 1. Aggregate subbase:
    - a. Sweep loose granular particles from surface of aggregate course. Do not dislodge or disturb in any way the aggregate embedded in compacted surface of subbase course.
    - b. Proof roll prepared sub-base surface to check for unstable areas and areas requiring additional compaction. Repair these areas as required. Do not begin paving work until deficient sub-base areas have been corrected and are ready to receive paving.
- B. General Surface Applications to Prepared Subbase:
  - 1. Herbicide application over subbase:
    - a. Apply herbicide treatment over dry compacted subbase, adhering strictly to herbicide manufacturer's instructions.
    - b. Take extreme precaution to confine weed killer to only those areas to be covered by asphalt concrete and provide all necessary protection to prevent injury or damage to life and property.
- C. General Surface Preparation for Slurry Seal Coat Application
  - 1. Potholes and other structural failure of the surface shall be repaired prior to placing the seal coat.
  - 2. The surface shall be swept clean of all debris, dirt, loose gravel and other loose articles. If necessary, the surface can be washed, but the surface must be dry before the seal coat is applied.

### 3.04 INSTALLATION

- A. Techniques:
  - 1. Placing the mix:
    - a. Spread mix at minimum temperature of 225 degrees F.
    - b. Place asphalt concrete mix on prepared surface and strike off. Place inaccessible and small areas using hand tools.
      - 1) Check mat frequently during placement, to verify correct thickness.
    - c. Before rolling operations begin, check surface using template and straightedge, and correct irregularities.
    - d. Width of paving strips:
      - 1) Place mix in paving strips at least 10 feet wide.
      - 2) Roll first paving strip after placement. Place subsequent paving strips, extending rolling operation to overlap preceding strips.
    - e. Coursing requirements:
      - 1) Lifts:
        - (a) Base Course:
          - (1) Place plant-mixed asphalt concrete base course in single lift.
          - (2) Compact to 95 percent.

- (3) Moisture Content: Use only the amount of moisture needed to achieve the specified compaction.
2. Joints:
    - a. General: Construct joints to form continuous bond between adjoining portions of work. Ensure that texture and density of pavement are continuous across the joint. Surface across joint shall form smooth, uninterrupted plane and shall not pond water.
    - b. Joint locations include the following:
      - 1) Between pavements laid on successive days.
      - 2) At any point in paving where material already laid has become cold because of delay.
    - c. Clean by brushing, or cut fresh vertical face using power saw if necessary, wherever contact surface of previously constructed pavement has become coated by dust, sand, or other objectionable material.
    - d. Apply thin tack coat on vertical contact surface before beginning placement of new material.
  3. Rolling:
    - a. Start rolling operation as soon as hot mix will bear weight of roller and can be compacted without unacceptable displacement of material.
    - b. Comply with roller manufacturer's recommended rolling speed, but in no case exceed 3 miles per hour.
    - c. Avoid sharp turns and abrupt starts and stops.
    - d. Compact mixture in areas inaccessible to rollers using hot hand tampers or vibrating plate compactors.
    - e. Breakdown rolling:
      - 1) If grade is not absolutely level, begin breakdown rolling on low side of spread. Progress toward high side.
      - 2) Execute initial breakdown pass with drive wheel forward toward the direction of paving.
      - 3) Examine surface immediately after breakdown rolling. Repair as necessary by loosening material in defective areas and filling with hot material.
    - f. Second (intermediate) rolling:
      - 1) Execute second rolling as soon as possible after breakdown rolling, while mixture is still hot enough to achieve maximum density.
      - 2) Continue repeating the pattern until mixture has been compacted thoroughly.
    - g. Finish rolling:
      - 1) Execute finish rolling while mixture is sufficiently warm to allow removal of roller marks.
      - 2) Continue rolling operation until maximum density is achieved and roller marks are entirely eradicated.
  4. Asphalt Concrete Curbs:
    - a. Construct curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust.
    - b. Place curb material to cross-section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms as soon as material has cooled.
  5. Seal Coat:
    - a. Parking Areas, Driveways, Walkways and Ramps: Dilute the asphalt emulsion with water at the rate of 1 part emulsion to 1 part water and apply at a rate of 0.1 gallons (of diluted material) per square yard. Emulsion shall be applied uniformly over entire area, and extreme care must be exercised so there will be no spots with excess material which would remain tacky.
  6. Patching:
    - a. Remove paved areas which are contaminated with foreign materials or which are defective in any way. Replace removed material with fresh, hot mix. Compact by

- rolling until maximum density and smoothness are achieved and there is no detectable variation between patch and adjacent paving.
  - b. Patch or re-pave area as required as a result of reconstruction or adjusting manholes, cleanouts, vaults, grates, etc. to proper grade.
- 7. Restriction of traffic:
  - a. Upon completion of rolling operations, do not permit vehicular traffic on pavement until it has cooled and hardened sufficiently.
  - b. Erect clearly-visible barricades and take other measures as required to protect pavement.
- 8. Wood Headers:
  - a. Install along all edges of asphalt concrete paving except where concrete paving, walks and curbs occur. Set top edge of header to conform to grade of asphalt paving. Benders of lesser thickness may be used to form returns.
  - b. Space stakes not exceed 4' on centers, unless otherwise noted. Drive stakes to a depth of 1" below the top of the header and nail to headers.
  - c. Splice joints between individual header boards with a 1" thick board same height as header and not less than 24" long.
- B. Interface with Other Products:
  - 1. Pavement marking:
    - a. Do not begin application of pavement-marking paint until architect has approved marking placement.
      - 1) Verify proper placement of each color of marking paint.
    - b. Sweep and clean pavement surface thoroughly, immediately before application of marking paint. Pavement shall be dry and in proper condition to receive paint.
    - c. Use mechanical paint applicator to create pavement marks with consistently even edges. Apply 2 coats at paint manufacturer's recommended spreading rates.
    - d. Layout play courts to exact requirements of owner. Verify layout line widths and color prior to painting.
  - 2. Installation Tolerances:
    - a. Maximum allowable variance of in-place compacted thickness from design thickness -- base course: Plus 1/2 inch, minus zero inches.
    - b. Maximum allowable variance of surface smoothness - base course: Plus or minus 1/4 inch.
      - 1) Use 10-foot straightedge moved systematically over entire paved area to determine compliance with surface smoothness tolerance indicated.
    - c. In-place density: Pavement shall be compacted to at least 96 percent of density obtained by laboratory compaction.

### **3.05 BASE COURSE**

- A. Place and compact base course.

### **3.06 PREPARATION - PRIMER**

- A. Apply primer in accordance with manufacturer's instructions.

### **3.07 PREPARATION - TACK COAT**

- A. Apply tack coat in accordance with manufacturer's instructions.

### **3.08 PLACING ASPHALT PAVEMENT - SINGLE COURSE**

- A. Install Work in accordance with State of California Public Work's standards.
- B. Place asphalt within 24 hours of applying primer or tack coat.
- C. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- D. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

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### 3.09 SLURRY SEAL COAT APPLICATION

- A. Repair cracks in asphalt prior to placement of slurry seal.
  - 1. Prepare cracks by removing any dirt, weeds, or old crack filler from cracks. If weeds are growing through cracks, apply herbicide per specifications on affected areas.
  - 2. Fill cracks with rubberized asphalt-emulsion crack filler.
  - 3. Compact filler with tamp as required to eliminate voids.
  - 4. Prior to applying sealcoat allow crack filler to cure 48 hours minimum or as recommended by the manufacturer.
- B. Mix asphalt emulsion, water, mineral filler and aggregate in a mixer.
- C. Apply mixture in an average thickness of 1/8th to 1/4th inches. The mixture should form a creamy-textured mixture which, when spread, will flow in a wave approximately two (2) feet ahead of the strike-off squeegee.
- D. Allow mixture to cure for 48 hours.
- E. Apply a second seal coat in the same manner as the first coat and allow the second coat to cure for 48 hours.
- F. Test surface at the end of the second curing process to insure surface is dry and not tacky. Apply paint for striping and open for traffic after paint has dried.

### 3.10 GRIND AND OVERLAY

- A. Asphalt grind and overlay as indicated on drawings.
- B. Grind existing upper 2" of asphalt paving.
- C. Apply tack coat in accordance with manufacturer's instructions.
- D. Place asphalt in single lift in accordance with State of California Public Work's standards.
- E. Place asphalt within 24 hours of applying tack coat.
- F. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- G. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.
- H. Apply seal coat to overlay in accordance with State of California Public Work's standards.

### 3.11 SEAL COAT

- A. Apply seal coat to surface course in accordance with State of California Public Work's standards.

### 3.12 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch (6 mm) measured with 10 foot (3 m) straight edge.
- B. Compacted Thickness: Within 1/4 inch (6 mm) of specified or indicated thickness.
- C. Variation from True Elevation: Within 1/2 inch (12 mm).

### 3.13 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for quality control.
- B. General: Test in-place asphalt concrete courses for compliance with requirements for thickness, surface smoothness and density. Repair or remove and replace unacceptable paving as directed by Architect.
- C. Thickness: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness.
  - 1. Base Course: Specified thickness minus 1/2".
  - 2. Surface Course: Specified thickness plus or minus 1/4".
- D. Surface Smoothness: Test unfinished surface of each asphalt concrete course for smoothness, using 10' straight edge applied parallel with, and at right angles to centerline of paved area.

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Surface will not be acceptable if exceeding the following tolerances for smoothness.

1. Base Course Surface: 1/4".
2. Wearing Course Surface: 1/8".

E. Flood Test: Prior to application of seal coats, perform a flood test in the presence of the Owner's representative.

1. Method:
  - a. Flood the entire asphalt concrete paved areas with water by use of a tank truck or hoses.
  - b. If a depression occurs, where water ponds to a depth of more than 1/8", fill or otherwise correct to provide proper drainage.
  - c. Feather and smooth the edges of fill so that the joint between fill and original surface is invisible.

F. Densities:

1. Density of the asphalt concrete after rolling shall be 95 percent of the density obtained with the California Kneading Compactor per California Test 304.
  - a. Density of the aggregate base course shall be 95 percent of maximum relative density.

G. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.

### **3.14 PROTECTION**

- A. Immediately after placement, protect pavement from mechanical injury for 10 days or until surface temperature is less than 140 degrees F (60 degrees C).

**SECTION 32 1313  
CONCRETE PAVING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete paving.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 1000 - Concrete Forming and Accessories.
- B. Section 03 2000 - Concrete Reinforcing.
- C. Section 03 3000 - Cast-in-Place Concrete.
- D. Section 31 2323 - Fill: Compacted subbase for paving.

**1.03 REFERENCE STANDARDS**

- A. 2019 California Building Code, Chapter 19A.
- B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- C. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.
- E. ACI 305R - Hot Weather Concreting; 2010.
- F. ACI 306R - Cold Weather Concreting; 2010.
- G. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.
- H. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- I. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- J. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
- K. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.
- L. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- M. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2014.
- N. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.
- O. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.
- P. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
- Q. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Samples: Submit one sample panel, 4'-0" by 8'-0" inch (1,219 by 2,438 mm) in size illustrating broom finish.

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- C. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.
- D. Quality Control Submittals: Refer to Section 03 3000 Cast-In-Place Concrete. These requirements are applicable to this section.

## **PART 2 PRODUCTS**

### **2.01 FORM MATERIALS**

- A. Wood form material, profiled to suit conditions.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
  - 1. Thickness: 1/2 inch (12 mm).

### **2.02 REINFORCEMENT**

- A. Reinforcing Steel: ASTM A615/A615M, Grade 80 (80,000 psi) (550 MPa) yield strength; deformed billet steel bars; unfinished.
- B. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.
- C. Dowels: ASTM A615/A615M, Grade 40 - 40,000 psi (280 MPa) yield strength; deformed billet steel bars; unfinished finish. Dowel sizing shall be as indicated on drawings.

### **2.03 CONCRETE MATERIALS**

- A. Obtain cementitious materials from same source throughout.
- B. Cement: ASTM C150/C150M, Type II/V Portland cement, gray color.
- C. Fine and Coarse Mix Aggregates: ASTM C33/C33M.
- D. Fly Ash: ASTM C618, Class C or F.
- E. Water: Clean, and not detrimental to concrete.

### **2.04 ACCESSORIES**

- A. Curing Compound: ASTM C 309, Type 1, Class A.
- B. Joint Sealer: Type as specified in Section 07900.

### **2.05 CONCRETE MIX DESIGN**

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- C. Concrete Properties:
  - 1. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; 3,250 psi (22.41 MPa).
  - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  - 3. Minimum cement content per cubic yard: 6.5 sacks.
  - 4. Maximum water-cement ratio per 94-pound sack of cement (gallons): 6.75.
  - 5. Water-Cement Ratio: Maximum 50 percent by weight.
  - 6. Total Air Content: 4 percent, determined in accordance with ASTM C173/C173M.
  - 7. Maximum Slump: 4 inches (100 mm).
  - 8. Maximum Aggregate Size: 1 inch (25.4 mm).

### **2.06 CODE REGULATIONS**

- A. Portland cement concrete paving shall be stable, firm, and slip resistant and shall comply with CBC Sections 11B-302 and 11B-403.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

### **3.02 SUBBASE**

- A. Prepare subbase in accordance with State of California Public Works standards.

### **3.03 PREPARATION**

- A. Moisten base to minimize absorption of water from fresh concrete.

### **3.04 FORMING**

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

### **3.05 REINFORCEMENT**

- A. Place reinforcement at midheight of slabs-on-grade.
- B. Interrupt reinforcement at contraction joints.
- C. Place dowels to achieve pavement and curb alignment as detailed.

### **3.06 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304R.
- B. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- D. Apply surface retarder to all exposed surfaces in accordance with manufacturer's instructions.

### **3.07 JOINTS**

- A. Align curb, gutter, and sidewalk joints.
- B. Place 3/8 inch (10 mm) wide expansion joints at 20 foot (6 m) intervals and to separate paving from vertical surfaces and other components and in pattern indicated.
  - 1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch (13 mm) of finished surface.
  - 2. Secure to resist movement by wet concrete.
- C. Provide scored joints.
  - 1. At 5 feet (1.524 m) intervals, or as indicated on the drawings.
  - 2. Between sidewalks and curbs.
  - 3. Between curbs and pavement.

### **3.08 FINISHING**

- A. Sidewalk Paving: (Surfaces less than 5% slope): medium broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.
- B. Sidewalk / Ramp Paving: (Surfaces greater than 5% slope): heavy broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.
- C. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

### **3.09 TOLERANCES**

- A. Maximum Variation of Surface Flatness: 1/4 inch (6 mm) in 10 ft (3 m).

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- B. Maximum Variation From True Position: 1/4 inch (6 mm).

### **3.10 CONCRETE CURING**

- A. Comply with requirements of ACI 308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Moist cure and maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
  - 1. Normal concrete: Not less than 5 days.
- C. Surfaces Not in Contact with Forms:
  - 1. Start initial curing as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
  - 2. Begin final curing after initial curing but before surface is dry.
    - a. Curing compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

### **3.11 PROTECTION**

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.
  - 1. Pedestrian traffic can be allowed within 3 days of finishing when protection of the surface is provided. Architect to review the Contractor's proposed method of protection.
- C. Do not permit vehicular traffic over pavement for 14 days minimum after finishing.

### **3.12 CONCRETE PAVING REPAIR**

- A. Where damage to concrete paving or concrete curbing occurs, the contractor shall remove and replace the damaged material to the nearest joint. Patching concrete paving and curbing is not an acceptable means of repair.